

RESILIENCE IN ACTION: ADAPTIVE GOVERNANCE FOR SUBAK, RICE
TERRACES, AND WATER TEMPLES IN BALI, INDONESIA

by

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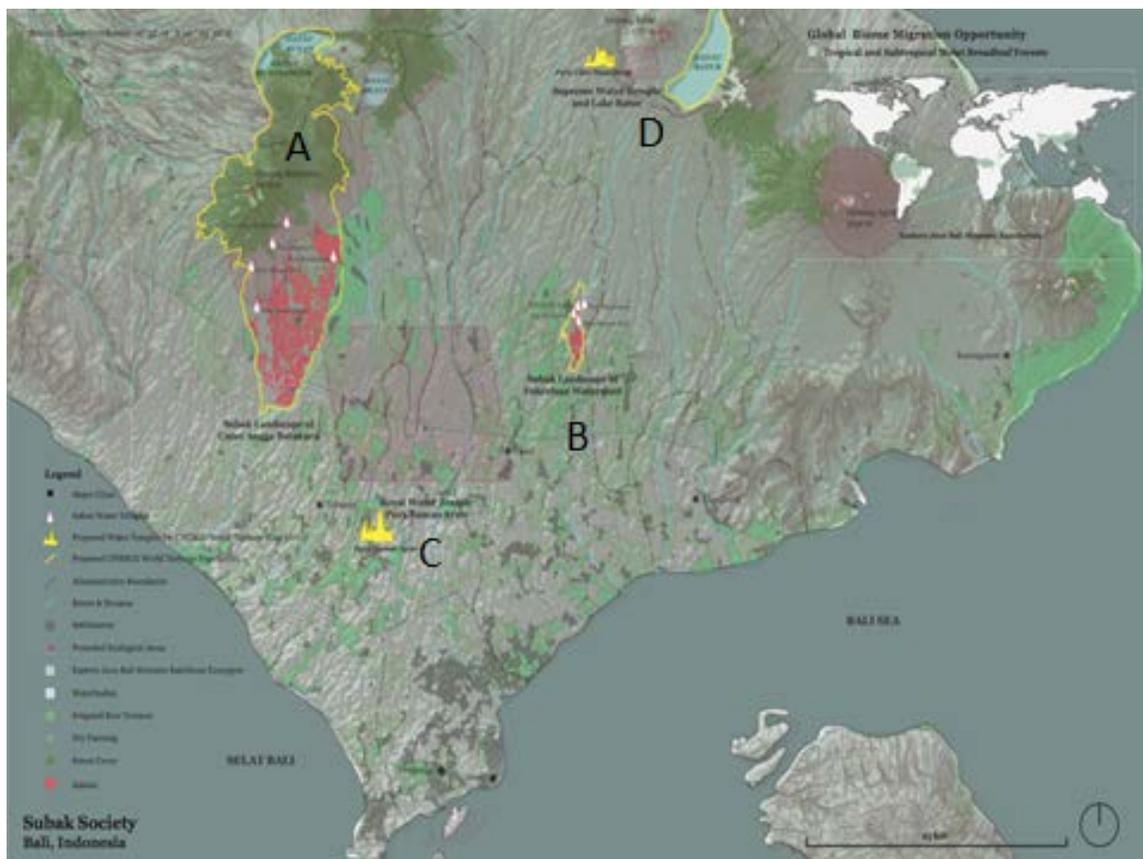
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ABSTRACT

Although there is a growing literature on resilience and collaborative approaches to ecosystem management, there are relatively few empirical case studies on the process of adaptive governance. Moreover, previous research offers limited insights into the conditions that facilitate new ecosystem management trajectories. By analyzing the emergence of an adaptive co-management initiative in Bali, the UNESCO World Heritage Cultural Landscape of Bali Province, this dissertation seeks to contribute to recent research on institutional governance approaches to enhance ecosystem management and social well-being. To that end, it addresses two questions. First, it identifies and explores three primary characteristics that fostered a new multi-level adaptive governance approach to cultural landscape management in Bali: the widespread perception of environmental crisis on the island that triggered collective action and the political will for a new form of ecosystem management; the emergence of a shared ideology—articulated in the Balinese Hindu philosophy of *tri hita karana*, or “the three causes of prosperity”—that unified diverse actors and actor networks and established a common platform for ecological resource management; and context-specific governance strategies that built on existing institutions and local-level initiatives.

The second question centers on an analysis of the emergence of the management plan for the World Heritage site in Bali. The management plan was developed to support the Balinese *subak* in its struggle to adapt to current and future pressures that threaten to undermine the island’s unique social-ecological system. For centuries, the subak have

maintained Bali's terraced rice paddy landscape as a network of semi-autonomous irrigation associations, mediated through water temples. The adaptive co-management plan draws on principles of adaptive governance to connect subaks with other actors and actor groups across multiple institutional levels and regional jurisdictions. Research findings support the likelihood that the World Heritage initiative can promote transformative change in cultural landscape management in Bali. As the initiative develops, it will provide a fertile site for future research on adaptive governance, to better understand interdependent social-ecological relationships and the evolution of adaptive co-management approaches.



Map of Cultural Landscape of Bali Province: Ecological Features and Water Temples; A) Catur Angga Batukaru, B) Pakerisan Watershed, C) Pura Taman Ayun in Mengwi, and D) Pura Ulun Danu Batur and Lake Batur.

CHAPTER 1 INTRODUCTION

The recent and unprecedented rate of global change threatens biological and cultural systems worldwide. It is widely understood that coping with these changes requires new institutional governance and environmental management strategies. But what are the conditions that facilitate such institutional innovations and the processes through which they emerge? This dissertation uses a resilience framework to analyze ongoing social-ecological changes and emerging institutional responses on the island of Bali, Indonesia. While Bali's unique agroecosystems have encountered significant disturbances over time, with colonial administration in the 19th century and the Green Revolution of the 1970s, there is a perception that the island now faces a slate of disturbances that threaten to undermine the functioning of its thousand year old cultural landscape. These disturbances represent a "tipping point" that many argue may lead to the disintegration of Bali's unique social-ecological system. It is, in part, this sense of crisis that has precipitated the emergence of an innovative collaborative governance approach to social-ecological conservation in Bali, in the form of a UNESCO World Heritage Cultural Landscape initiative.

In my analysis, I propose that there are three primary conditions that fostered a new adaptive governance approach to cultural landscape management in Bali. First, the sense that the island has reached a tipping point sparked the political will to develop adaptive institutions. Second, the institutional change underway on the island is grounded in deeper cosmological philosophies and environmental ethics that catalyzed collective

action. The Balinese Hindu philosophy of *tri hita karana* – the three causes of prosperity or the good—emerged as a unifying ethos around which conservation strategies formed and diverse agendas found common ground. Third, governance strategies were highly place-based, specific to and building on existing local institutions, livelihood strategies, and perceptions of environmental change. Balinese water associations, known as *subak*,¹ have sustainably managed the complex system of rice terraces and accompanying temple rituals for centuries. New frameworks for multi-level adaptive management of Bali’s “water mountains” mirrored the collaborative, flexible, and multi-level governance embodied in the *subak*.

While there is a growing literature on resilience and collaborative approaches to ecosystem management, there are relatively few empirical case studies of how the process of adaptive governance occurs (Plummer, 2009). One of the primary purposes of this dissertation is to provide a critical historical perspective on the emergence of a strategy for adaptive governance, as it was negotiated by people in Bali and with the central government in Jakarta. In June 2012, UNESCO officially inscribed the Cultural Landscape of Bali Province, or *Warisan Budaya Dunia*, as a World Heritage site. Efforts to establish the site began in 2000. After several deferments and resubmissions to UNESCO between 2002 and 2007 (discussed in chapter 6), Bali’s planning team for the Cultural Landscape project shifted the focus of the initiative based on recommendations from the International Council on Monuments and Sites (ICOMOS), the advisory board to UNESCO charged with evaluating World Heritage proposals. Rather than center on a

¹ This dissertation uses *subak*, for singular and plural forms.

loose cluster of sites chosen for either cultural or natural value, the new proposal was organized around the cultural landscape of the subak, as the socio-religious institution that has maintained the complex ecology of the rice terraces for a millennium. This new focus called for a new governance strategy, in the form of adaptive co-management, based largely on subak governance.

Theoretical Perspective

This research and Bali's Cultural Landscape model draw on the concepts of resilience, adaptive governance, and adaptive co-management. The idea of resilience emerged from the ecological sciences in the early 1970s (Holling, 1973) and now exists across a number of disciplines. In the social sciences, resilience is largely used in reference to complex social and ecological systems. In this context, resilience is defined as the amount of change a system can absorb without undergoing fundamental change in its functional characteristics, the degree to which the system can self-organize, and the ability to build and increase the capacity for learning and adaptation (Gunderson and Holling, 2002). This view of resilience emphasizes the capacity to adapt to and foster change by maintaining diversity, flexibility, and redundancy. It also emphasizes the interconnectedness of social and ecological systems; focusing on only the social or ecological dimension of resource management limits our capacity to achieve sustainable outcomes (Folke, *et al.* 2005). The resilience concept aptly characterizes the "adaptive dance" (Olsson, *et al.* 2004) at play in Balinese farmers' long-term management of the island's rice terraces (Lansing, 2006; Janssen and Anderies, 2007; Lorenzen and

Lorenzen, 2011). It also underlies the emergence of new mechanisms for social-ecological governance in Bali's complex and interconnected landscape.

Adaptive governance refers to governance regimes that accommodate change, uncertainty and complexity across social and ecological scales. Adaptive governance connects individuals and agencies across multiple institutional and geographic levels (Folke *et al.*, 2005). This form of governance fosters flexible, collaborative, learning-based approaches to ecosystem management operationalized through systems of adaptive co-management (Folke *et al.*, 2003; Olsson *et al.*, 2004). Olsson *et al.* (2004) define adaptive co-management as flexible, community-based systems of resource management in which rights and responsibilities are jointly shared across multiple organizational levels, from the local to the global.

Folke *et al.* (2005) identify various social characteristics that enable adaptive social-ecological governance, namely multi-level social networks that stimulate collaboration, build trust, foster the exchange of information, and encourage the development of common perspectives. Research in Bali and elsewhere suggests that cosmology is another critical, if often overlooked, aspect of social-ecological resilience and adaptive governance. Indigenous cosmologies are often rendered invisible in extralocal conservation encounters, which tend to focus on local people's environmental relationships to resources or ecosystem services (West, 2005; Runk, 2009). In this analysis, cosmological orientation, centered on the Balinese philosophy of *tri hita karana*, is an important element in the formation of common conservation perspectives among diverse, multi-level actors. My findings, which I present in chapter 4, suggest that *tri hita*

karana entered quotidian discourse in Bali as recently as the 1980s. The concept is deeply embedded, however, in the Balinese Hindu division of the cosmos into three interconnected dimensions and a complex of values and ritual practices devoted to maintaining or restoring harmonious balance among the opposing forces of the three worlds (Eiseman, 1995; Agung, 2005). In Bali, the continuing quest for balance and cosmic order underlies the sustainability of the subak and natural resource management. Presently, the guiding and universal philosophy of tri hita karana has provided a common organizing platform for the emergence of novel adaptive governance mechanisms in Bali.

Much of the work in resilience and adaptive governance focuses on larger-scale ecological and institutional systems and processes. It is thus difficult to ascertain the characteristics of households that comprise these larger (nested) systems. Similarly, work in livelihoods tends to focus on household-level decisions, influenced by transformative, but not fully linked to social and ecological processes. Recent literature extends the concept of adaptive governance by linking it to livelihoods approaches (Adger, 2000; Adger *et al.*, 2002; Marschke and Berkes, 2006; Plummer and Armitage, 2006; Armitage, 2007). A livelihood refers to the strategies by which individuals and households earn a living and pursue their goals, depending on the range of capabilities and tangible and intangible assets available in a given context. From a livelihoods perspective, household decision-making involves trade-offs among desired social, economic, and ecological outcomes. Resilient livelihoods are those that cope with and recover from shocks and stresses, maintain or enhance existing capabilities and assets,

and ensure livelihood opportunities for future generations (Chambers and Conway, 1991; Ellis, 1998; Scoones, 1998).

This research in Bali and the plan for managing the cultural landscape site attempt to integrate the livelihoods framework with the resilience approach. Indigenous landscape management in Bali is a dynamic, multi-level, collaborative effort that has evolved over the past thousand years, centered on the subak. Historical and archaeological research illustrates the ability of the subak to adapt to emerging challenges, whether ecological, economic, or political (Lansing, 1991, 2006; Jha and Schoenfelder, 2011). Thus, understanding and bolstering the livelihood strategies that have sustained the system over time in light of current multi-level pressures is critical to the ongoing formation of adaptive governance mechanisms. Central to this research is a focus on the assets and strategies of Balinese farmers in the cultural landscape site, as well their perceptions of environmental and institutional change. The management plan emphasizes household livelihood support and protection for farming households, as members of the subak, and establishes a framework for monitoring drivers of social and ecological change across multiple scales.

What are the conditions that facilitate such institutional innovations? What are the processes through which they emerge?

As noted above, these are the central questions driving this research. The original focus of this study was the emergence of an innovative organic farming project in the village of Wangaya Betan, in the Batukaru area of Bali. The project was initiated in early

2005 by a small group of entrepreneurial farmers from the subak Wangaya Betan and a progressive researcher in Bali's Ministry of Agriculture (*Balai Pengkajian Teknologi Pertanian*, or BPTP). By 2006, the group formed the non-governmental organization *Somya Pertiwi*, meaning "Gifts of the Earth Goddess." Although this project began with a sub-set of the subak, by 2008, it had expanded to all 90 members of the Wangaya Betan subak and beyond to other subak in the area. Initial pre-dissertation fieldwork in July 2006 suggested that Somya Pertiwi exemplified a process of social-ecological resilience in action. Indeed, recent work by Lorenzen (2011) characterizes subak Wangaya Betan as one with "transformative capacity." Similarly, MacRae and Arthawiguna (2011) and MacRae (2011) argue that subak Wangaya Betan's transition to sustainable organic rice farming is unprecedented in Bali. Corroborating Lansing's research on the Balinese subak, MacRae and Arthawiguna (2011: 19) draw on research in Wangaya Betan to conclude that subak are "parts of systems which manage a dynamic equilibrium between change and continuity." Recent developments in Wangaya Betan illuminate the capacity of the subak to adapt and engage in "a new kind of change outside its traditional mandate of water management." Like Lorenzen, MacRae, and Arthawiguna, I set out to understand the dynamic transformation underway in the subak Wangaya Betan and the ongoing process of adaptation that may provide insights into social-ecological resilience.

Early in my fieldwork, I learned that my field site of Wangaya Betan and the surrounding area was designated as part of the area included in the World Heritage Cultural Landscape of Bali Province. This revelation led me from the rice fields of subak Wangaya Betan to the surrounding terraces and temple network, the forested watersheds

that feed the subak irrigation system, and the offices of government officials charged with coordinating the new model for social-ecological governance at a larger scale. Though the essential research questions remained the same, the scope of my project shifted to the process of reframing Bali's World Heritage Cultural Landscape nomination. I focused my research on this process unfolding before me that was incorporating and building on the organic farming project in Wangaya Betan.

It was also a process in which I participated. Together with researchers from Bali's Agricultural Research and Technology Assessment Unit (BPTP), the Indonesian Ministry of Culture and Tourism, the Anthropologist J. Stephen Lansing, and graduate students from the Stockholm Resilience Centre, I conducted site visits and collected data throughout the areas included in the Cultural Landscape proposal submitted to UNESCO January 2009. Through the course of participant observation of the nomination process and data collection at proposed World Heritage field sites, I had conversations with World Heritage team members that led to my involvement as a contributor to the management plan.² The management plan was created as a flexible, working guideline. Since I left Bali in 2009, the management plan and the coordinating structures have changed, and I expect they will continue to be selectively adapted.

Organization of the Dissertation

This dissertation is organized into six chapters. Chapter 2 presents the theoretical perspective and background for the study. Here, I explore the concepts of resilience and

² In this capacity, I drew on the existing (pre-2008) management plan and stakeholder consultation in Bali, as well as professional experience in institutional development and monitoring and evaluation systems.

adaptive governance and their application to social and environmental change in Bali. I also present contextual information on Bali and the Balinese subak, as well as UNESCO World Heritage Cultural Landscapes. Chapter 2 closes with a section describing the methodological approaches and data collection tools used in this study. Chapter 3 focuses on the perception of environmental crisis in Bali and the extent to which it marks a tipping point, or a point at which the system could change irreversibly. Here, I highlight recent and unprecedented changes underway that threaten the survival of the subak and irrigated rice farming in Bali, drawing on secondary data as well as findings from empirical research. Alternatively, in Bali, this perception of crisis may have created a “window of opportunity,” marking a new trajectory of transformative change to enhance the resilience of the system.

Chapter 4 explores the importance of cosmology for adaptive governance and the emergence of tri hita karana as an organizing principle in Bali’s Cultural Landscape model. Chapter 5 presents a case study analysis of the organic farming project in Wangaya Betan. This initiative represents a promising local-level response to the challenges facing Bali’s subak. Chapter 6 presents the UNESCO World Heritage Cultural Landscape of Bali Province model for adaptive governance. Here, I discuss the process of negotiation through which the model emerged, its structure and essential characteristics, and challenges to its implementation. The concluding chapter presents a synthesis of the key research findings on the conditions that have contributed to transformative change in Bali. By highlighting critical components of the process in Bali and presenting a working model for adaptive governance, this dissertation seeks to

contribute to ongoing research on the management of social-ecological systems in a rapidly changing world.

CHAPTER 2 RESILIENCE, ADAPTIVE GOVERNANCE, AND THE BALINESE SUBAK

This chapter presents the conceptual and methodological background for this dissertation. First, I examine the concept of resilience as a framework for understanding coupled social and ecological systems. I also investigate adaptive governance and adaptive co-management as conceptual and operational approaches to enhance the resilience of social-ecological systems. Second, I introduce Bali as the context for this study, focusing on the Balinese subak and a brief history of the Green Revolution. The third and final section of this chapter presents the methodological approaches and data collection methods of this dissertation and the Warisan Budaya Dunia World Heritage project during the 2008-2009 study period.

A. Resilience and Adaptive Governance

As ecology emerged as a field of study in the mid-nineteenth century, it incorporated the long-standing assumption that nature, left undisturbed, maintains a single stable equilibrium. This perspective reflects in part the frame of reference for observing change in the structure and function of the natural world, which usually spanned a few years to decades (McCoy and Shrader-Frechette, 1992). A departure from the homeostatic ecosystem model emerged in the 1970s, with landmark publications by May (1974; 1976) and Holling (1973). May uses mathematical models to demonstrate that even the simplest linear equations used to describe the growth of a single species can produce

apparently random fluctuations in populations within some range of parameter values. “The bizarre behavior exhibited by the simplest of discrete nonlinear systems are surely the rule, not the exception, outside the physical sciences” (May 1976: 467). Holling observes that ecological systems continually confront unexpected and exogenous change. He argues that natural resource management practices based on an equilibrium view, such as maximum sustained yield from a fish population, for example, may actually increase the possibility of the population’s extinction because they do not account for stochastic change. Thus, Holling (1973: 14) introduces the idea of resilience, “a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables.” In other words, the resilience of a system determines its potential to persist or become extinct. In contrast, stability is the ability of a system to experience a temporary perturbation and then return to an equilibrium state with minimal fluctuation.

Since the publication of Holling’s paper, literature on resilience has flourished, exhibiting a multitude of seemingly contradictory definitions (McCoy and Shrader-Frechette, 1992; Adger, 2000; Berkes *et al.*, 2003; Jen, 2005; Eakin and Luers, 2006; Folke, 2006; Nelson *et al.*, 2007; Bahadur *et al.*, 2010). Engineering resilience, for example, focuses on efficiency, control, and predictability. The goal is reliable performance in the presence of failures, an interpretation of resilience that follows from Holling’s definition of stability near an equilibrium state. In contrast, ecosystem resilience emphasizes persistence, adaptive capacity, variability, and unpredictability. This follows from Holling’s use of resilience (Gunderson and Holling, 2002: 27-32):

resilience in complex social-ecological systems is defined as the amount of change a system can absorb without undergoing fundamental change in its functional characteristics, the degree to which the system can self-organize, and the ability to build and increase the capacity for learning and adaptation. This view of resilience emphasizes maintaining diversity, flexibility, and redundancy. Rather than trying to optimize one part of the system, it is preferable to maintain a range of options to buffer disturbance and create novelty. It is this latter definition that underpins adaptive governance in complex systems.

Characteristics of Resilience

In a review of various conceptualizations of resilience, Bahadur *et al.* (2010) examine major areas of convergence to identify key characteristics of social-ecological systems resilience. Their findings indicate that the most significant attribute of resilient systems is diversity of functional groups. This refers to ecological diversity as well as a range of economic opportunities, institutional partnerships, and policy constituencies. Diverse functional groups are interrelated. For example, “rural livelihoods and well-being are strongly dependent on the diversity and health of ecosystems and the services they provide” (Berkes, 2007: 289). A second important characteristic is governance, specifically the ability of institutions and institutional structures to effectively build resilience in a system. Persha *et al.*'s (2011) multi-country analysis of forest systems concludes that participation in local forest governance institutions has strong positive outcomes for both ecological and social dimensions of forest systems. This recent

finding corroborates a central theme in the resilience literature, which stresses the need for decentralized organizational structures and policies that are flexible and grounded in local realities. As Osbahr (2007: 14) writes, resilience requires “polycentric and multi-layered institutions to improve the fit between knowledge, action and the context in which societies can respond more adaptively at appropriate scales.” Related to this, the roles institutions play can contribute to resilience. In particular, institutions that facilitate learning and experimentation, monitor processes and outcomes, and modify policy accordingly are critical to building resilience (Carpenter *et al.*, 2001).

A number of other characteristics of resilient systems are prevalent in the literature. The ability to navigate uncertainty and change is a hallmark of the resilience approach (Folke *et al.*, 2002; Berkes *et al.*, 2003), following from Holling’s (1973) conceptualization of complex systems. The greater the resilience of a system, the more readily it will absorb unexpected disturbances and adapt to change. Conversely, in a system lacking resilience, ecosystems and institutions are less able to cope with and adapt to change (Adger, 2000).

Leadership, equity, and community engagement are also important characteristics of resilient systems (Berkes and Folke, 1998; Adger, 2000; Nelson *et al.*, 2007; Ostrom, 2009). Within a social-ecological system, key individuals provide leadership, entrepreneurship, and vision— characteristics that are considered essential for effective collaboration, self-organization, and sustainable ecosystem management (Folke *et al.*, 2005; Ostrom, 2009). In studies of irrigation systems in India, for example, the participation of influential elders and college graduates was found to have a strong

positive effect on irrigation and groundwater management (Meinzen-Dick, 2007).

Resilience research also demonstrates that shared rights and responsibilities for resource management promote resilient systems (Nelson *et al.*, 2007; Ostrom, 2009). As Nelson *et al.* (2007) point out, current strategies to enhance resilience tend to favor those most able to access and benefit from governance institutions (*i.e.*, those least at risk).

Considerations of equity and social justice are critical for management approaches that seek to increase resilience. With regard to community engagement, the literature highlights the importance of participatory governance and user ownership of resources for enhancing resilience (Ostrom, 2009; Bahadur *et al.*, 2010). There is general agreement that community-based and partnership approaches are most effective for environmental governance (Wallington *et al.*, 2008). Ostrom (2009) observes that when resource users have autonomy to craft and enforce some of their own rules, resource sustainability increases. In their work on legitimacy and participation in environmental governance, Wallington *et al.* (2008) explore various challenges for novel approaches in Australia. They argue that rather than a shift from “old” to “new” forms of governance, emerging governance arrangements take on a “hybrid” nature involving a range of government and civil society stakeholders. In new governance arrangements, there is a need to better understand macro-level relationships between the state and civil society, as well as micro-level actors and knowledge systems.

Similarly, the resilience literature stresses the inclusion of local or traditional knowledge as an important component of social-ecological resilience (Berkes *et al.*, 2000; Berkes and Turner, 2006). In a recent review of indigenous knowledge and

resilience, Bohensky and Maru (2011) found evidence of the loss of resilience attributed to the loss of traditional ecological knowledge together with other factors (e.g., Milestad and Hadatsch, 2003).³ However, the authors did not encounter empirical evidence that the maintenance or revitalization of indigenous knowledge enhances resilience. This finding may stem, in part, from the focus of resilience studies on systems that have lost resilience and “crossed a threshold” (Walker and Meyers, 2004). More generally, knowledge of the social-ecological system is considered a principal indicator of sustainability. Ostrom (2009: 421) cites the example of Easter Island to illustrate the importance of system knowledge: when resources regenerate slowly, and while the population grows rapidly, resource users may lack knowledge of the system’s carrying capacity and fail to organize effectively, leading to the collapse of the system.

Throughout the literature, scale is considered an important attribute of complex systems and resilience. Complex social-ecological systems are composed of multiple and hierarchic subsystems in which each subsystem is nested in a larger subsystem. Berkes *et al.* (2003: 6) provide a useful example for conceptualizing scale in complex systems. A small watershed, for example, may be referred to as an ecosystem, but it is part of a larger watershed comprised of all the smaller watersheds. Similarly, institutions charged with watershed management may be organized hierarchically, as nested subsystems. Because there is feedback from one level to another (e.g., local to regional; small watershed to larger watershed) and across scales (e.g., fluctuations in water level coupled with water

³ Milestad and Hadatsch (2003) attribute the decline of resilience of farms in Austria to the loss of traditional ecological knowledge, along with other factors such as structural changes in agriculture and societal transformation.

quality managers), the system should be analyzed simultaneously across scale. Cash *et al.* (2006) find increasing evidence that consciously addressing scale and the dynamic linkages across levels improves the capacity to assess problems and find solutions that are more politically and ecologically sustainable. Gunderson and Holling (2002) suggest that new institutions and mechanisms are needed to better understand interactions across and within spatial and temporal scales.

Sociocultural values and cosmology undergird the attributes of resilience. While reference to cosmology is limited in the resilience literature, it is recognized as a source of our values and our understanding of the natural world and our place in it (Berkes, 1999; Houde, 2007). Worldviews mediate the formation of traditional ecological knowledge, which contributes to resilient social-ecological systems (Berkes, 1999; Berkes *et al.*, 2000). Values are often characterized as social capital or norms that mediate human-nature relationships and resource use (Mayunga, 2007). As Ostrom (2009: 421) observes for all types of resource systems, when resource users “share moral and ethical standards of how to behave in groups they form, and thus the norms of reciprocity, and have sufficient trust in each other to keep agreements,” self-organizing to sustain a resource is more likely. In identifying the essential characteristics of disaster resilience, Twigg (2007) argues that shared cultural values, attitudes, aspirations, and goals enable communities to better adapt to and recover from shocks or stresses. In work on traditional ecological knowledge in Canadian First Nations, Houde (2007) refers to a culturally based cosmology that underpins environmental ethics and values and gives meaning to the knowledge system. Houde asserts that the cosmological context of

collaborative resource management arrangements is complex and often difficult to accommodate, particularly when various stakeholder groups maintain dissimilar worldviews. Understanding diverse cosmologies and knowledge systems, however, facilitates collaborative environmental management and allows for the emergence of novel approaches to enhancing sustainability.

An important set of concepts underlying the resilience perspective is that of “regime shifts” (Scheffer and Carpenter, 2003), thresholds (Walker and Meyers, 2004) and tipping points (Brock, 2004). Regime shifts refer to seemingly sudden and dramatic shifts in ecosystems. They are typically difficult to predict and often emerge from multiple and compounding drivers of change. Regime shifts are now documented for a number of ecosystems, including the decline of ancient Sahelian vegetation punctuated by a collapse into a desert, a shift in lakes from clear to turbid, and the transformation of coral reefs into algal states. In the case of Caribbean coral reefs, for example, although researchers had studied the reefs for decades and came to understand some aspects of these systems, no one anticipated the sudden shift of the majority of coastal reefs to algal systems. Retrospectively, the complex interplay of variables became apparent. Changes in land use caused nutrient loading that promoted algal growth. However, herbivorous fish suppressed the algae. Over time, intensive fishing reduced fish populations, allowing a sea urchin to become the primary herbivore. When the urchin species succumbed to a pathogen, algae rapidly overtook the reef systems (Nystrom *et al.*, 2000). Once algal growth reached a certain threshold, the system shifted to an alternate “dynamic regime” (Scheffer and Carpenter, 2003).

The occurrence of these multiple dynamic regimes (also referred to as alternate stable states or basins of attraction) has profound implications for the way social-ecological systems respond to variation and the way we manage for complexity. Following the work of Holling (1973) and May (1974; 1976) on the ability of systems to absorb disturbances and the dynamic nature of ecosystem change, recent research has emphasized the notion of these multiple states in social-ecological systems and the thresholds between them (Walker and Meyers, 2004; Nelson *et al.*, 2007). Thresholds are the boundaries around a given state, which “if crossed represent the transition into another system state” (Nelson *et al.*, 2007: 401-402). As noted above, thresholds or tipping points are difficult to predict in complex systems defined by non-linear feedback and are thus more readily ascertained after or during a regime shift into a new state. These aspects of the resilience perspective shift policies and programs away from controlling resource flows in systems considered stable, to “managing the capacity of social-ecological systems to cope with, adapt to, and shape change” (Folke, 2006: 253).

It follows that the resilience approach shifts our focus away from maintaining the status quo to specific aspects of adaptation that may enhance longer-term resilience. From an evolutionary biology perspective, adaptation is succinctly defined by Lewontin (2002: 43) as the process of fitting an organism to a preexisting demand. Furthermore, the organism is constantly changing or “constructing” its environment, and therefore the environment of other organisms. In social-ecological systems, adaptation may center on reducing the impacts of change or taking advantage of new opportunities that change creates (Folke *et al.*, 2003: 375). Nelson *et al.* (2007: 397) consider adaptation as

adjustments people make in response to current or anticipated change. Elaborating more fully, they define adaptation as “the decision-making process and the set of actions undertaken to maintain the capacity to deal with future change or perturbations to a social-ecological system without undergoing significant changes in function, structural identity, or feedbacks of that system while maintaining the option to develop.” This contrasts from the biological definition of adaptation, implying that people mitigate anticipated perturbations, rather than responding to current ones.

Adaptive Governance and Adaptive Co-Management

Adaptive governance refers to governance systems that foster resilience and adaptation. As Folke *et al.* (2005: 441) observe, adaptive governance regimes “often self-organize as social networks with teams and actor groups that draw on various knowledge systems and experiences for the development of a common understanding and policies.” Such systems accommodate change and uncertainty, and connect individuals and agencies across multiple institutional and geographic levels. Resilience thinking favors governance mechanisms in which decision-making power is decentralized and rights and responsibilities are shared. Berkes (2002) suggests that effective adaptive governance connects local- and higher-level (*e.g.*, state) management systems, arguing that neither one is sufficient on its own: rather, governance arrangements aim to achieve a balance between centralized and decentralized control. Similarly, Ostrom (2009) contends that to achieve long-term sustainability, government and resource-user rules

must be congruent with local conditions. In other words, higher-level management practices and enforcement must not override rules devised at the local level.

In their landmark paper on adaptive governance, Folke *et al.* (2005) identify adaptive co-management as the mechanism through which adaptive governance is operationalized. Olsson *et al.* (2004) define adaptive co-management as flexible, community-based systems of resource management in which rights and responsibilities are jointly shared across multiple organizational scales. Armitage *et al.* (2007: 6) identify selected features of adaptive co-management, including a shared vision or goal among stakeholders; a high degree of dialogue and collaboration among actors at multiple scales; a degree of autonomy, and shared control and responsibility among actors; and a “flexible and negotiated learning orientation with an inherent recognition of uncertainty.”

The flexible structure allows for learning-by-doing and innovation, hallmarks of adaptive management (Berkes and Folke, 1998). This provides opportunities for institutions to respond to and shape change. Adaptive co-management emphasizes “feedback learning,” in which small disturbances to the system produce a change or adaptive adjustments from which people can learn and generate new knowledge and practices (Berkes and Turner, 2006). In contemporary marine conservation systems in Vanuatu, for example, communities combine traditional approaches with government Fisheries Department recommendations into a new synthetic approach that meets contemporary demands for income. In this example, village fishers engage in an ongoing process of experimentation, knowledge generation, and adaptive management in collaboration with the Department (Johannes, 1998).

One mechanism to promote feedback learning in adaptive co-management arrangements is monitoring and evaluation systems. Systematic evaluation is fundamental to assessing change. Presently, there is a dearth of research and experience in co-management evaluation. Existing approaches to monitoring and evaluation are predicated on linear management systems, based on the assumption that programs and policies lead to predictable outcomes. Complex systems theory requires new mechanisms that adequately address interrelated social and ecological parameters and enable feedback and learning at multiple levels. Plummer and Armitage (2006) advocate an evaluative framework that integrates three broad components: ecosystem conditions, sustainable livelihoods processes and outcomes, and institutional processes. The authors contend that a resilience perspective on evaluation fosters social learning and reflexivity. Moreover, evaluation of complex systems needs to prioritize responding or adapting to feedback on both processes and outcomes.

Livelihood Security and Resilience

Recently, the integration of adaptive co-management and livelihoods approaches has gained traction in resilience work. As observed by Berkes *et al.* (2003), social-ecological resilience is determined in part by the livelihood security of a household or community, which contributes to the capacity to absorb shocks and stressors and reorganize. The sustainable livelihoods framework provides an analytical structure for grappling with the interconnections among socio-economic outcomes and governance interventions (Plummer and Armitage, 2006; Armitage *et al.*, 2007). This approach takes as its point of

departure the five categories of assets or capital articulated in the livelihoods framework (Mayunga, 2007): social, natural, physical, economic, and human (Chambers and Conway, 1991; Scoones, 1998). For example, the role of social capital in building community resilience, indicated by trust, norms, and social networks, is pervasive in the literature (Adger, 2000; Folke *et al.*, 2005; Mayunga, 2007; Ostrom, 2009). Individuals, households, and communities employ livelihood strategies in pursuit of a range of livelihood outcomes, such as income generation, health, and vulnerability reduction. Sustainability depends on the capacity of a community to access and utilize the major forms of capital to achieve favorable livelihood outcomes.

The use of the livelihoods framework is particularly valuable for resilience work in that it focuses the analysis on the decisions and constraints of households and communities in a holistic way. However, most livelihoods analyses assume a single stable state. Households and the strategies they employ are embedded in a given context (social, political, cultural, environmental, institutional). In complex systems, livelihoods are nested in dynamic, multi-scalar states characterized by uncertainty and unpredictable outcomes. The latter view articulates administrative or ecological context, for example, as distinct scales, operating across multiple levels (Cash *et al.*, 2006). Contextual attributes become fully integrated as components of a multi-scalar system. Events at one level of the system directly or indirectly affect conditions at other levels (*i.e.*, cross-scale feedbacks). Policy interventions may contribute to desired social or economic outcomes (*e.g.*, increase in household income or food production) at the expense of desired ecological outcomes (*e.g.*, deforestation), which may have different and unpredictable

effects across scales (*e.g.*, deforestation leading to reduced water catchment and downstream water shortages). Thus, multi-level analytical and co-management models are needed to understand dynamic and differential livelihood change across scales (Armitage, 2007). As Plummer and Armitage (2006) observe, the livelihood approach provides a framework to link natural capital and the social processes, structures, and institutions that shape livelihoods.

There is a great deal of enthusiasm associated with the potential resilience and adaptive governance to inform the development of mechanisms to cope with the deterioration of natural systems worldwide. There are also a number of important counter arguments to the nascent “gospel of resilience” (Nadasdy, 2007). For example, Doubleday (2007) observes that the role of culture in adaptive governance has not been well-defined. She advocates a long-term approach to adaptive co-management that recognizes cultural diversity as a source of resilience and actively considers culture in adaptive practice. Nachter *et al.* (2005) caution, however, that cultural differences can hinder equitable collaboration and result in “hidden” conflicts. Nadasdy (2007) focuses on the embeddedness of adaptive management institutions and management in the relations of capitalist production. He argues that “adaptive co-management, like all environmental management, is an inherently political undertaking, not simply a technical one” (Nadasdy, 2007: 223). For Nadasdy, the failure to attend to power relations in adaptive governance fuels economic inequality and political marginalization.

As the fields of complex social-ecological systems, resilience, and adaptive governance advance, new critical questions will be raised about the conceptual and

empirical gaps in current frameworks and analyses. Ostrom (2009: 420) remarks that a core challenge in social-ecological systems work is in the “identification and analysis of relationships among multiple levels of these complex systems at different spatial and temporal scales.” Plummer and Armitage (2006: 63) further this, contending that there is a lack of evidence pertaining to the outcomes of co-management. Moreover, “evaluative mechanisms are ill-equipped to deal with emerging views of reality, such as complex systems theory.” Increasingly, however, case studies on social-ecological governance inform and expand our understanding of resilience and adaptive capacity, thereby refining the ways these concepts are defined and applied. Using a social-ecological systems perspective offers a promising way to deal with complex relationships across multiple spatial and temporal scales. Emerging models for adaptive governance must meet the challenge of complexity by fostering place-based and culturally grounded frameworks that are useful to local communities, resource managers, and policy makers.

B. The Subak in Bali

This section provides background on the Balinese subak and, in particular, its persistence in light of the Green Revolution initiated in Bali in the early 1970s.

According to archaeological research, it is estimated that Austronesian farming communities settled in Bali around 2,600 years ago, first in coastal swamps and then near inland spring-fed areas (see Lansing, 2006: 25). Early inscriptions show that by 1,000 years ago, farmers had developed agricultural technologies such as plowing and transplanting, and small-scale irrigation systems at the village level. Over time, farmers

constructed a series of tunnels, aqueducts and canals to expand irrigated terraces on hills and ridges or “water mountains.” The expansion of irrigated rice agriculture was fragmentary and decentralized, reflecting Bali’s steep, dissected landscape. To cope with the rugged topography and the prevalence of microenvironments in Bali, farmers from multiple villages combined to form subak institutions that coordinate the distribution of irrigation water from a common source, such as a spring or irrigation canal (Wisseman Wisseman Christie, 1992).

The subak system is organized as a hierarchical temple network: small paddy field, or *sawah*, temples are nested within subak temples, and again within an entire irrigation system. The hierarchy continues to the Temple of the Crater Lake whose goddess Dewi Danu “makes the rivers flow” (Lansing, 2006: 41-54). The subak network manages not only water allocation, but also pest control at the watershed scale. Research has demonstrated that by synchronizing cropping schedules across subak, farmers can flood paddy fields at appropriate times to deprive pests of habitat (Lansing, 1991).

The Balinese agronomist and subak researcher Alit Arthawiguna (2008) argues that, “As a farmer organization, the subak cannot be separated from agricultural land, especially from [the] paddy field ecosystem.” For Arthawiguna, the principal function of the subak in water management translates to the multiple roles of food production, ecosystem management, social mediation, and biodiversity maintenance. Similarly, the Balinese subak scholar, Dr. Nyoman Sutawan (1989), Professor Emeritus at Bali’s Udayana University, depicts the “multi-functionality” of the subak in irrigation agriculture. In addition to food and fiber, the subak contributes to flood and soil erosion

control, groundwater recharge, small-scale generation of hydro-power, and provision of habitat for diverse flora and fauna. Sutawan also comments on the intangible value of the “beautiful landscape” maintained by subak that form the basis for ecotourism development in Bali’s main rice producing areas.

Today, it is estimated that between 1,200 and 1,800 subak manage a network of irrigated fields in Bali. In 2007, the total rice producing area was estimated at 81, 235 hectares, 29 percent of which is found in the regency of Tabanan, known as Bali’s *lumbung beras*, or rice granary (BPS, 2008). Of the island’s nearly 3.5 million inhabitants, the majority work in agriculture. Census figures for Bali from 2007 indicate 36 percent of people over the age of 15 work in this sector. In Tabanan, that figure increases to 46 percent (BPS Tabanan, 2008). Average per capita income tends to be lower in Tabanan than for the island overall. In 2007, the average per capita income in Tabanan was US \$826 (7,736,753 rupiah) compared to US \$1,316 (12,166,391 rupiah) for the whole island of Bali (BPS, 2008; BPS Tabanan, 2008).

While farming households are considered the main productive unit in Bali, every household that cultivates paddy is a member of the subak in which their field is located. Based on extensive ethnographic research among subak in south-central Bali, Lorenzen and Lorenzen (2011) chronicle the daily activities of subak members and the function of the subak collectively. For the most part, households undertake irrigation work and farming activities at the field level. The primary function of the subak is the efficient and equitable distribution of water. To this end, subak members contribute to maintenance

and renovation work on communal canals and weirs. Members also partake in religious rituals and regular meetings to determine planting schedules (Lansing, 1991).

The Lorenzen's (2008) observe that the distribution of water is negotiated on a daily basis, among farmers, subak heads, known as *pekaseh*, and heads of sub-subak (or *tempek*), who are referred to as *kelien*. Formal and informal arrangements concerning subak membership, territory, rights and duties are embedded into social and ritual interactions among members and with adjacent subak (Sutawan, 2000). As Lansing's (1991) work on subak cooperation and pest control reveals, each subak belongs to a congregation of subak whose members share equally in the maintenance of the main canals and weirs, as well as performance of the annual rituals at regional temples.

The Green Revolution

Prior to the 1970s, this agroecosystem featured a variety of rice landraces along with diverse flora and fauna well-suited to the ecological landscape. In turn, the water temple network represented a dynamic institution where farmers would meet to negotiate cropping schedules and farming practices responsive to environmental conditions, inextricably linked to and organized by ritual cycles. These institutions effectively managed cooperative water allocation and pest populations at the ecosystem scale, and stabilized (rather than maximized) yields across subak (Lansing, 1991; Lansing, *et al.* 2006). The cost was a high investment in intensive cultivation, ritual practices, and cooperative labor to maintain physical terraces, irrigation systems (Janssen and Anderies, 2007). While conflicts (*i.e.*, disturbances) occurred within and between subak, the

institution had developed mechanisms of governance, including the intervention of temple priests. Thus, in instances of conflict (*i.e.*, an opportunity for change), the system was “protected” by a higher level. The entire network structure was adaptive: “perturbations that change local payoffs trigger small cascades of change that allow the entire network to respond effectively to events such as the addition of a new irrigation system or a new rice pest” (Lansing, 2006: 86).

The advent of the Green Revolution in the late 1960s instigated a transformation that threatened Bali’s highly adaptive farming system. With the fall of Sukarno in 1965, Suharto instituted a new agricultural policy that opened the door to foreign capital and technical assistance. The BIMAS (*Bimbingan Massal* or “Massive Guidance”) program, which began in 1965, combined price supports for surplus rice along with measures to accelerate agricultural production. In 1967, the government released two new high-yielding rice varieties (HYVs), IR-8 and IR-5, developed by the International Rice Research Institute (IRRI) in the Philippines. To achieve high yields, the varieties required chemical fertilizers and pesticides. Thus, seed stock was combined with chemical inputs into packages distributed on credit by the Swiss firm CIBA. Distribution was channeled through village-level branches of the Bank Rakyat Indonesia. According to Cederroth and Gerdin (1986: 127), “the first year of the project was a failure...As a result, the Government had to repay CIBA about eight million US dollars...For the peasants who more or less willingly had taken part, it meant in many cases personal catastrophe, and a negative attitude towards the HYVs spread rapidly.”

Despite the dismal results, the government regrouped and expanded the project the following year, with reported losses of 10 million US dollars. In 1968, shortages of fertilizer and domestic credit compelled the government to begin BIMAS *Gotong Royong* (BGR or “Mutual Self-help Program”), in which foreign firms directly supplied credit, inputs, and technical assistance to farmers through market channels. By 1971, credit was no longer guaranteed by the state. To ensure repayment of the loans, farmers were required to hand over land ownership certificates to the bank until credit was repaid in full. Widespread defaults along with methods such as aerial spraying of chemical pesticides without farmers’ consent contributed to the negative perceptions of BGR. Empirical studies from the period show disparate rates of adoption and increasing socio-economic polarization (Ward, 1985; Antlov, 1986; Cederroth and Gerdin, 1986: 137; Lansing, 1991; Djurfeldt and Jirstrom, 2005; Lansing, 2006).

To boost rice yields, the government then mandated a shift in cropping patterns that had previously been coordinated through the subak and water temples. IRRI rice scientists developed the rice variety IR-36, which was fast-maturing and, unlike IR-8, resistant to the brown planthopper, an insect that reportedly destroyed two million tons of rice in 1977. In Bali, farmers were legally required to plant two to three crops of IR-36 annually. The government prohibited planting traditional rice varieties, which are less responsive to fertilizers, produce less grain, and are slower to mature. To further increase yields, the Asian Development Bank launched the Bali Irrigation Project (BIP) in 1979. BIP was the first major irrigation improvement scheme in Bali. It aimed to “intervene in 130 subaks (about 10 percent of the total Bali subaks)” in the areas of subak coordination,

cropping patterns and techniques, and reconstruct a number of weirs and associated irrigation works (Bali Irrigation Project Feasibility Study, 1981, in Lansing, 1991: 113).

By the late 1970s, the water temples had begun to relinquish control of irrigation and cropping schedules. As Lansing (1991: 114) observes,

In the upper reaches of the rivers, where coordination of irrigation was essential during the dry season, farmers often refused to abandon the temple schedules and native Balinese rice varieties, or landraces. But further downstream, the threat of legal penalties against anyone failing to grow the new rice, or *beras baru*, led to continuous cropping of the Green Revolution rice. Religious rituals continued in the temples, but field rituals no longer matched the actual stages of rice growth.

Together, these technological introductions and mandates overcame pest outbreaks and achieved remarkable increases in rice yields. From 1967-90, Indonesia had one of the highest growth rates in rice yields in Asia at four percent, second only to Lao PDR (4.4%) (Dawe, 2004). In Bali, nearly half of the terraces of the south-central “rice bowl” were planted with high-yielding varieties by 1974. By 1977, that had reached 70 percent (Lansing 1991: 113). Rice yields increased from 2.5 tons per hectare in the early 1970s to more than five tons per hectare in the years that followed (Arthawiguna, 2008).

During the next decade, however, yields dropped dramatically in Indonesia and throughout Asia (Table 1). In 1992, an external review of IRRI concluded that there were unexplained declines in rice yields, especially at the highest levels of intensive cultivation (Doberman and Witt, 2004). Along with yield declines, empirical studies from the period also found increasing social polarization. Research on the impacts of the Green Revolution in Lombok, an island to the east of Bali, asserts that: “While the wealthy have earned more than ever before, the poor have become even more numerous

and even more poor” (Cederroth and Gerdin, 1986: 137). By the mid-1980s, Balinese farmers faced what district agricultural officers described as “chaos in the water scheduling” and “explosions of pest populations” (Department of Public Works, Tabanan, 1985, in Lansing 1991: 114).

Table 1. Average annual growth rates of rice yields in Indonesia and Asia overall

	Period	
	1967-90	1990-99
	(%)	
Indonesia	4.0	0.0
Asia	2.3	0.9

Source: FAOStat on-line data base (in Dawe, 2004: 61).

Problems with pest outbreaks, water shortages, and overall declines in yield were attributed to various causes, ranging from “lagged spending” on agricultural research (Rosegrant and Evenson, 1992) to insufficient pesticide use (Lansing 1991) and inappropriate policies (Pingali and Rosegrant, 2001). Although researchers recognized that the fall in productivity during the 1990s was greatest in those areas of Asia that first adopted intensive Green Revolution technologies, it was argued that “intensification, *per se* is not the root cause of environmental and ecological damage” (Pingali and Rosegrant, 2001: 397). Interestingly, few evaluation reports and studies made reference to environmental degradation or the role of social organization and processes. An IRRI review, for example, identifies only one study in South Asia that used extensive data on soil and water quality to measure the importance of environmental factors on yield

productivity (Dawe, 2004). Similarly, as Lansing (1991) observes in Bali, evaluations of BIP neglected the role of the subak and water temples in irrigation and agricultural management.

By the mid-1980s, there was increasing recognition of the centuries-old Balinese ritual calendar, based on cultivation of Balinese landraces. As documented in Lansing (1991), temple priests and farmers advocated the importance of the water temples to coordinate cropping cycles to ensure sufficient irrigation water and to manage pests through synchronized fallow periods. With the Green Revolution, agricultural production in Indonesia was reduced to the optimization of rice yields. The disruption of the nested water temple hierarchy—invisible to agricultural planners—and intensive chemical agriculture triggered declining soil fertility, biodiversity loss, recurrent pest outbreaks, and water shortages, as well as coastal reef degradation from agrochemical run-off (Lansing *et al.* 2001; Lansing 2006). In addition, New Order governance instituted top-down management practices that effectively marginalized local participation (Warren 2007). Control over irrigation systems was considered the purview of the state. In resilience terms, the social and ecological systems became decoupled.

As a result of the recognition of the value of the water temple network for maintaining the long-term sustainability of the system, pressure increased on local officials to return control of irrigation to the subaks and the water temples. Subsequently, the subak have returned to ritualized planting cycles in most of Bali (see Lansing 1991: 124-125). Particularly, in the upland areas of Bali's principal rice-producing region—

those areas that were less affected by BIMAS and BIP, farmers continue to plant traditional Balinese landraces.

While the cumulative effects of the Green Revolution have rendered Bali's agroecological system more vulnerable to more recent shocks and stresses (discussed in chapter 3), the story of the Green Revolution in Bali is a testament to the resilience of the subak. In a recent special issue on the Balinese subak, Jha and Schoenfelder (2011: 8) draw on historical and archaeological research to argue that the subak has maintained a high degree of continuity over time, in both structure and function. The authors write:

Perhaps it is this ability to be transformed that is the subak's greatest asset, leading to its resilience through the centuries. Subak will prosper if their members can empower themselves to become more active partners in movements for change that are strictly speaking outside the subak's traditional mandate of irrigation management.... The key to survival of the subak in these changing times lies in a combination of strategies that include switching to alternative methods of farming, sustainably exploiting any possible synergy with tourism, enacting laws that limit the conversion of arable land to other uses, securing subak rights to water resources, and recruiting the combined defensive talents of those with its welfare at heart.

As the subak encounter more recent pressures associated with the fast pace of development, the key to their survival may also lie in the capacity to enact these strategies at a scale sufficient to maintain network of water temples and the flow of irrigation from sawah to sawah.

Complexity in Bali

The Balinese agroecosystem fits neatly into a resilience framework—a textbook example of multi-scalar self-organization and social-ecological feedbacks. Moreover, it provides fertile ground to advance an ideal-type model for adaptive co-management. Scholars of Bali, namely Lansing (2006) and Geertz (1980), offer a note of caution, however. As Geertz (1980 in Lansing 2006: 5-6) observed:

It is fatally easy to fit the Balinese state to one or another of these familiar models, or to all of them at once.... Yet to reduce [it] to such tired commonplaces, the worn coin of European ideological debate, is to allow most of what is most interesting about it to escape from view. Whatever intelligence it may have to offer us about the nature of politics, it can hardly be that big fish eat little fish, or that the rags of virtue mask the engines of privilege.

Bali exemplifies complexity. While its network of hierarchically nested sawah, linked to similarly nested subak, mediated by temple priests and ritual practice exemplify the concept of social-ecological resilience, this story oversimplifies the complexity of sociocultural and spatio-temporal relations permeating Balinese society and landscapes. The instruments of adaptive governance are blunt, yet, as Ostrom (2009: 420) suggests, “Understanding a complex whole requires knowledge about specific variables and how their component parts are related. Thus, we must learn how to dissect and harness complexity, rather than eliminate it” from our understanding of complex social-ecological systems. In the Balinese case, the subak-sawah-temple complex presents a unique opportunity to comprehend the evolution of adaptive governance over a millennium. The complexity of Bali’s social and ecological landscapes is too vast to be fully apprehended. The challenge of adaptive

governance in the twenty-first century is to parse out those essential elements that will enhance the resilience of the system in light of contemporary disturbances.

C. UNESCO World Heritage Cultural Landscapes

In Bali, UNESCO World Heritage provided an institutional framework for the emergence of adaptive governance. In 1972 the general conference of UNESCO adopted the *Convention concerning the Protection of the World Cultural and Natural Heritage*.

The purpose of the convention is to ensure the identification, protection, and conservation of cultural and natural heritage of “outstanding universal value.” According to

UNESCO’s guidelines for implementing the World Heritage Convention (WHC, 2011:

2):

The cultural and natural heritage is among the priceless and irreplaceable assets, not only of each nation, but of humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitutes an impoverishment of the heritage of all the peoples of the world. Parts of that heritage, because of their exceptional qualities, can be considered to be of “Outstanding Universal Value” and as such worthy of special protection against the dangers which increasingly threaten them.

Thus, the Convention is particularly attentive to UNESCO’s mandate to protect cultural and natural heritage sites from “new global threats.” World Heritage sites are among the most recognized places in the world, including Australia’s Great Barrier Reef, Egypt’s Pyramids at Giza, and the Great Wall of China. It is the participating national governments, signatories to the Convention, which have responsibility to select and nominate sites for consideration as World Heritage sites. The process of nominating sites

involves long-term dialogue between the Indonesian government, local government authorities, and UNESCO officials (Darma Putra and Hitchcock, 2005).

In 1992, UNESCO adopted “cultural landscapes” as a category of sites for World Heritage nominations. Cultural landscapes are defined as “combined works of nature and of man,” where human interaction with natural systems has, over time, formed a distinctive landscape. Acceptance of this category in UNESCO is attributed, in part, to the first global United Nations Earth Summit in 1992, that articulated a new way of thinking about the inter-relationship between humans and the environment and a vision for sustainable development (see Mitchell *et al.*, 2009). As of March 2012, the UNESCO World Heritage list included 86 designated Cultural Landscape properties, of 962 properties worldwide.⁴ Most of these cultural landscape sites, such as the Coffee Cultural Landscape of Columbia, the Kaya Forest systems in Kenya, and the Konso Cultural Landscape of Ethiopia, are living cultural landscapes. The Director of the UNESCO World Heritage Centre Francesco Bandarin observes, “it is the work of local communities and indigenous people, the daily work and lives which maintain these sites, often through their own protection measures” (Mitchell *et al.*, 2009: 4). According to Bandarin, with the adoption of the cultural landscape category, customary law and management systems are increasingly accepted at a global level. Supporting the management of complex interactions between people and the environment in the context of rapid socio-economic and climate change is a pressing challenge.

⁴ See: <http://whc.unesco.org/en/list/>.

World Heritage in Indonesia

Including the Cultural Landscape of Bali Province, there are eight World Heritage sites in Indonesia. Among the first and most well-known were Borobudur Temple Compounds in central Java and Komodo National Park, both inscribed in 1991. While nominations for these sites were well-received at the time, a proposal to nominate Pura Besakih in Bali as a Cultural Heritage site was not. Pura Besakih is the largest and most significant temple complex in Bali, for World Heritage. The proposal, initiated in 1990, was met with widespread public resistance led by Bali's Hindu Council Parisadha, Bali's regional government assembly, and Balinese intellectuals. Broadly speaking, the Balinese feared that as a World Heritage site, Besakih would be treated as abandoned *warisan* (heritage), rather than the living, ritual complex it is. In part, this perception was based on the experience in Borobudur where ritual activities were banned. The proposal was rejected three times in a decade, largely over misunderstanding that the Balinese would lose control over and access to Besakih temple. In an analysis of the contested Besakih temple nomination, Darma Putra and Hitchcock (2005) suggest that the rejection by Bali's Hindu Council is understandable, but represents a misinterpretation of UNESCO's mission.

When the process to nominate a site of cultural and natural heritage in Bali began in 2000, the technical committee responsible for drafting proposals to nominate new sites was sensitive to the events surrounding Besakih temple. The team comprised researchers from Bali's Udayana University and other members of the intelligentsia, led by Professor

Dr Gde Parimartha, who was the head of Cultural and Tourism research at the university. As the nomination moved forward, the team insisted that the new nomination consider only sites in which, “All the stakeholders, especially the local government and the community agree and are ready to manage the site or the sites as World Heritage sites” (Ardika *et al.*, 2008: 5). The case of Besakih temple demonstrates the importance of clearly communicating the role of UNECSO World Heritage as an “international hallmark of quality” that raises the profile of a valued site, while control over and management of the site remains the purview of local populations (Darma Putra and Hitchcock, 2005).

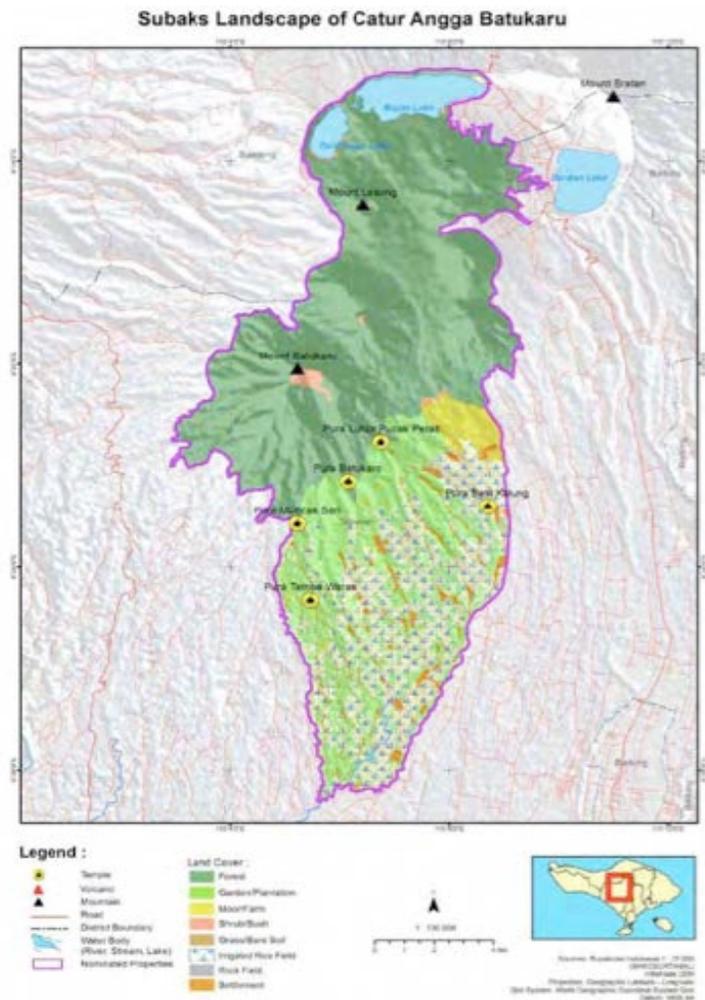
D. Research Sites and Methods

Research Sites

Catur Angga Batukaru

To ground my research and gain insights at the local level, I maintained my connection to the subak and village of Wangaya Betan and the surrounding area of Catur Angga Batukaru (hereafter Batukaru), where I conducted the majority of my research. Although the original World Heritage nomination documents (from 2000-2009) refer to the area as Jatiluwih, Batukaru encompasses the former and is a more accurate site description of the region. Whereas Jatiluwih refers simultaneously to a village, subak, and a general area of scenic vistas frequented by day tourists, Catur Angga Batukaru is historically and ritually defined by a network of interconnected water temples, subak, mountains, lakes, forests, and the rice terraces situated just below the forest, at the

northern edge of Tabanan's "lumbung beras." The map in Figure 1 depicts the landscape features of the area, namely the lakes that provide the source of irrigation water and the forested watershed that extends to these upland rice paddies, as well as the major water temples. There are 15 subak in the region. Figure 2 shows the position and area of the subak, with Jatiluwih and Piling subak occupying the northeastern most rice terraces in Batukaru.



**Figure 1. Map of Catur Angga Batukaru:
Ecological Features and Major Water Temples**

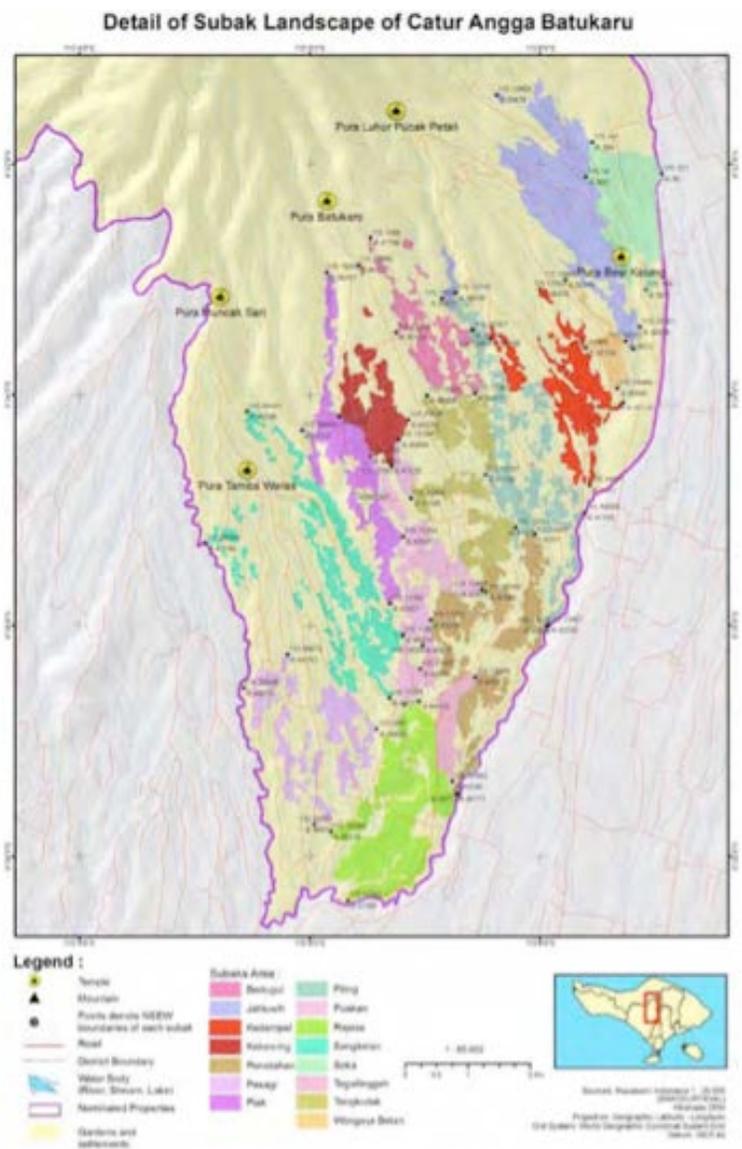


Figure 2. Map of Catur Angga Batukaru Subak

The temples, subak, and landscape features in the area are situated downslope from Bali’s second highest volcano, Mount Batukaru (7,467 feet). In accordance with

Balinese Hindu tradition, the area is considered the *utama mandala*, meaning highest mandala or sacred landscape of western Bali. It is bounded by five “guardian” temples, with Pura Luhur Batukaru at the center, depicted in Figure 3. As Geertz (1980: 81) observed, the subak planting cycle in Tabanan begins with a regional “water-opening” ritual at Pura Luhur Batukaru, attended by all pekaseh heads of subak and all subak temple priests, as well as any subak member who makes the pilgrimage to join in this ceremony conducted to ensure “sufficient and ‘effective’ water for all terraces in the realm in the coming season.” With this, the irrigation and rice planting cycle for the region is set in motion. The ritual opening ceremony honoring the Rice Goddess Dewi Sri will then be replicated at subak temples and the smaller bedugul shrines that mark the entrance of irrigation water to each farmer’s fields.

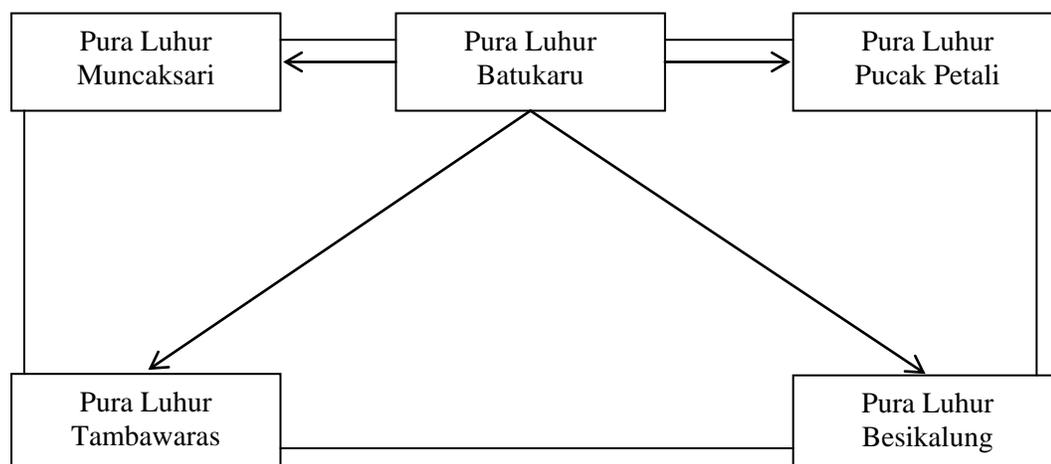


Figure 3. Major Temples of Catur Angga Batukaru⁵

At Pura Luhur Batukaru and each of its sister temples, subak periodically perform rituals to honor the gods and goddesses, bringing harvest offerings (*soewinih*) and

⁵ Source: Recreated from Indonesian Ministry of Culture and Tourism, 2011: II-16.

collecting holy water, or *tirtha*, to distribute to temples downstream. The temples in this region are particularly interesting because of the physical and metaphysical link they provide between the forested mountain landscape and the paddy fields. At Pura Luhur Pucak Petali, for example, subak worship the God of Petali Ida Sesuhunan Petali, the chief minister to the God of Mount Batukaru.

Throughout this region, rice farming continues to be the primary livelihood activity. The rice growing areas of the Batukaru site roughly correspond to the administrative boundary of Penebel district in northwestern Tabanan, one of 10 districts in the regency.⁶ Over 60 percent of Penebel's land area is planted to wet rice, distinguishing it as the district with the most irrigated rice terraces in the "lumbung beras." Penebel produces about 20 percent of Tabanan's rice, compared with the second highest rice producing district of Kediri to the south, with about 13 percent of the regency's paddy rice. Yield per hectare in Penebel is in line with the average harvest rate in Tabanan, at about five tons per hectare. Unlike other parts of Tabanan, however, the district of Penebel and the Batukaru region are widely recognized as areas where farmers continue to grow Balinese rice varieties using traditional methods. The Wangaya Betan family that graciously hosted me during my field visits in Batukaru was one of many who continue harvest rice with the small palm cutting knife, the *ani-ani*. In most areas of Bali, the *ani-ani* is no longer used, as it is ill-suited to the new hybrid rice varieties (Poffenberger and Zurbuchen, 1980).

⁶ The figures in this section are derived from BPS Tabanan, 2008.

Field Sites: UNESCO World Heritage Cultural Landscape of Bali Province

To complement intensive field work in Batukaru, I conducted research in each of the sites selected for World Heritage nomination, all of which reflect both the historical and present-day significance of the subak-water temple network. These areas included the water temples and subak of the Pakerisan Watershed and the Pura Taman Ayun in Mengwi. The dynamic capacity of the subak is well-represented in the Pakerisan area, which encompasses the oldest known irrigation system in Bali. Here, subak continue the tradition of paddy farming and temple rituals amidst the archaeological remains of ancient water temples and monastic sites dating from the ninth to eleventh centuries AD (Schoenfelder, 2003).

The Mengwi area, situated at a lower elevation than the other sites, encompasses the royal temple Pura Taman Ayun. The 20 subak of the Mengwi region epitomize the system of cooperative water distribution characteristic of the subak. Downstream subak frequently “borrow” water from those located upstream. Relative to the other sites, Mengwi experienced a higher level of intervention during the Green Revolution. Thus, interviews with temple priests and older farmers in this area provided valuable insight into the dramatic changes that have occurred in rice farming over the past 40 years. I also conducted research at Pura Ulun Danu Batur and Lake Batur. Balinese farmers believe Lake Batur to be the home of the Goddess of the Lakes, Dewi Danu, and the ultimate source of irrigation water. Pura Ulun Danu Batur, which sits on the rim of the volcanic crater overlooking the lake, is considered the supreme subak temple of Bali (Lansing, 1991).

In addition to the households, terraces, forests, and temples described above, the urban administrative center of Denpasar in southern Bali was another principal site of my research in Bali. Throughout the year, I frequented the offices and conference rooms of government officials at the various ministries of Culture and Tourism, Forestry, Environment, and Agriculture, along with those of academics from Bali's Udayana University, among others. In this way, my field of research extended across multiple levels of Bali's social, ecological, and institutional landscape.

Research Methods

When Holling introduced the notion of ecosystem resilience, he commented on the general tendency in ecology to stress quantitative over qualitative data, associated with measuring stable and predictable harvests from nature. In contrast, measuring resilience calls for a more qualitative approach that “would emphasize the need to keep options open, the need to view events in a regional rather than a local context, and the need to emphasize heterogeneity” (Holling 1973: 21). More recently, Berkes *et al.* (2003) argue that sustainability science requires new methodologies that combine qualitative and quantitative analysis and draw upon case studies to help understand how systems behave and guide management decisions. The authors contend that managing for resilience calls for qualitative analysis, following from the nonlinearity of complex systems and the need to understand the unique history and context of diverse systems at different scales. In the field of anthropology, there is a rich tradition of complementary qualitative and quantitative research methods (Bernard, 2002).

The present study uses a mixed methods approach to address the research questions in different social, ecological, and institutional contexts. Figure 4 presents a framework to illustrate the methodological approach. The major question of my research centers on the factors that contribute to new models of adaptive governance, at both social and ecological scales. The ecological variables of interest revolve primarily around social perceptions of environmental change, farming practices, and data collected by senior scientists with BPTP on indicators such as soil quality, rice production, and pesticide residues. The social variables of interest focus on livelihood and institutional (*i.e.*, subak) resilience, and cosmological orientation.

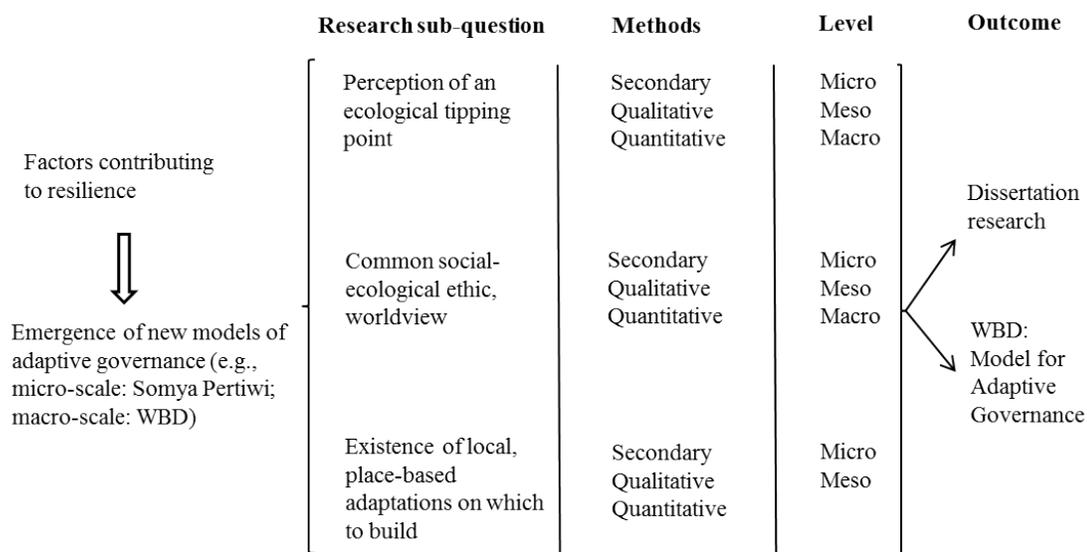


Figure 4. Methodological Framework

I derived secondary data from a variety of sources, including newspaper articles; reports and publications by Balinese researchers and government offices; customary *awig-awig* rules governing a subak, as available in written form; documentaries; and the

academic literature. Qualitative research methods included participant observation, key informant interviews, and focus group discussions. I conducted extensive participant observation at the various field sites. This ranged from accompanying subak farmers to their fields and springs and site visits to the lakes and temples comprising the proposed Cultural Landscape area, to attending temple ceremonies, and joining members of the nominating committee at numerous subak and stakeholder meetings. I was fortunate to attend a meeting with the Governor of Bali Province I Made Mangku Pastika to discuss the significance of the World Heritage proposal, as well as a gathering of provincial, national, and international participants in the UNESCO World Heritage nomination process in Borobudur, Java. I also conducted and recorded key informant interviews with farmers, pekaseh subak, temple priests, agricultural extension agents, government officials, academics, private businesspeople, and environmental activists. Together with research assistants, I facilitated focus group discussions with youth affiliated with Jatiluwih subak and subak members throughout Batukaru. We held these discussions to complement the quantitative data collected in this area simultaneously. This range of qualitative tools allowed me to collect information at all levels of analysis.

The heterogeneity and site-specificity of the subak in Bali is well documented (Jha, 2002; Lorenzen and Lorenzen, 2011; MacRae and Arthawiguna, 2011). While my research does not represent a detailed ethnographic study of a subak, I sought to gain deeper insights at the local level through intermittent residence in the village of Wangaya Betan, home of Somya Pertiwi. In March and April 2009, I collaborated with colleagues at BPTP to conduct a quantitative survey among subak in the Batukaru area. We drew a

simple random sample of 156 farm households from subak member lists for six subak (Appendix C): Jatiluwih, Soka Candi, Piling, Wangaya Betan, Peseletan, and Bedugul.⁷ By 2009, these six subak had collectively signed on as participants in the World Heritage initiative. The quantitative surveys collected data on basic demographic characteristics, land and livestock holding, farm practices, and perceptions of environmental change and subak governance. The data was entered using The Survey System (TSS) analyzed using the Statistical Package for the Social Sciences (SPSS) 19. Since the findings from the quantitative survey are relevant to each of the research questions, these data are integrated throughout the remaining chapters.

The research findings served two purposes: First, they contribute to ongoing research on adaptive governance and the conditions that foster novel, multi-level adaptive co-management approaches, presented in this dissertation. Second, my fieldwork contributed to the preparation of the nomination dossier and management plan for the World Heritage site in Bali, Warisan Budaya Dunia (WBD), presented in chapter 6 (IMCT, 2011).

⁷ Subak Jatiluwih is a *Subak Gede*, or Great Subak with over 500 farmer members and 300 hectares or irrigated paddy fields. Subak Jatiluwih is divided into seven *tempek*, or sub-subak.

CHAPTER 3 BALI ON THE BRINK

Bali has been long celebrated for the beauty of its culture and natural landscape. As early as the 1920s, travel writing and tourist brochures projected the image of an island paradise, “one of the world’s great romantic dreams” (Vickers, 1989: 1). Bali’s terraced “water mountains” figure prominently in this image. While this representation of Bali to the outside world has never conveyed the multi-layered and heterogeneous experience of its people nor its history (Vickers, 1989; Schulte Nordholt, 1994; Ramseyer and Tisna, 2001), it has attracted a steady stream of visitors to the island.

Presently, the future of the subak in Bali is uncertain. While Bali’s wet-rice cultivation system has adapted to changes and perturbations in the social-ecological landscape for over a millennium, the system now confronts new and multiple sources of turmoil. The rapid and unregulated pace of tourism and urban development threatens to undermine the famed agro-ecological landscape. Within the past decade, concern about the environment and debates on future development strategies have become a central focus in public discourse (see, for example, Warren, 2009). The subak and the landscape it manages are at the center of this discourse.

As Ostrom (2009) observes, resource collapse is predicted for large and highly valuable systems where resource users are diverse, fail to communicate, and do not develop effective rules or norms to manage the system. Since the 1970s, there are increasingly more—and more diverse—harvesters of Bali’s land, water, and forest catchment areas. At that time, Indonesia’s New Order government began to implement

development policies that benefited elite political and economic and political interests, a strategy that accelerated neglect of the agriculture sector in the 1990s (Warren, 2009). The policy environment has opened up Bali to unregulated and escalating resource extraction among non-agricultural users.

The mechanism for communication across multi-level resource users in Bali emerged over time, mediated through subak meetings and temple rituals (Lansing, 1991, 2006). Yet as the pool of resource users has grown and users' interests have diversified, the mechanism for adaptive governance is beginning to break down. Already, in areas of Bali closest to the urban center of Denpasar, it is commonly remarked that the subak exists "*dalam nama saja*", or in name only.

This chapter discusses the current threats to Bali's subak system, including the accumulation of agrochemicals leading to soil infertility and yield stagnation; tourism development that is driving an outmigration of young farmers, conversion of agricultural land, and water shortages; deforestation; and the compounding effect of decentralization, which hinders the development of management strategies at an ecosystem scale. Together, these threats may signal a tipping point toward collapse of the system. Alternatively, they may represent an opportunity for transformative change toward conserving the island's natural and cultural resources.

A. Green Revolution Agriculture: The Cumulative Effects

In Bali, sufficient quantities of potassium and phosphate are continuously leached from volcanic soils by rainfall and carried to rice fields via irrigation channels (Lansing *et al.*, 2001). Ash fall from periodic eruptions of Bali's active volcanoes, Mount Agung and Mount Batur, also replenish the soils of Bali with useful minerals (Whitten *et al.*, 1996). Prior to the 1970s, farmers throughout Bali relied on these nutrient-rich volcanic soils, microbial nitrogen fixation and nitrogen producing plants such as aquatic ferns (*azolla*), and traditional farming methods in which rice stalks are plowed into the field or burned, adding nutrients to the soil.

Since the onset of the Green Revolution in the 1970s, the Ministry of Agriculture has provided significant subsidies for agricultural inputs and encouraged the use of nitrogen, phosphate, and potassium (NPK) fertilizers to enhance agricultural productivity. This has resulted in a heavily subsidized fertilizer industry; five state-owned companies produce urea through the holding company, PT Agro Kimia Indonesia. In the past decade, fertilizer subsidies have increased significantly to represent 28 percent of national agricultural spending by the end of 2008. Between 2001 and 2007, the demand for urea, the principal target of the subsidies, doubled to reach five million tons (Osorio *et al.*, 2011).

The Ministry of Agriculture's standard recommendation for urea application in rice production is 200 to 250 kilograms urea per hectare, depending on a number of variables such as soil quality and irrigation. While actual use varies greatly across Indonesia, farmers typically use more than the recommended levels of fertilizer, in some cases two

to three times the recommended application (Osorio *et al.*, 2011). Soil and water analyses from various sites in Bali corroborate this finding (Lansing *et al.*, 2001; Lansing *et al.*, in progress).

The negative effects of excessive fertilizer use on land and water resources are well documented in Indonesia and elsewhere (see Osorio *et al.*, 2011). Over time, intensive fertilizer applications deplete organic matter in the soil, resulting in a loss of soil fertility and decreased yields (Ventura and Watanabe, 1993).⁸ Moreover, surplus urea flowing out of terraces and into rivers has a significantly adverse effect on coral reefs. By 2008, an estimated 60 percent of the island's coral reefs had died or were severely damaged, leaving only 24 square miles of healthy reef (*Bali Times*, 2008). Although untreated industrial sewage and destructive fishing practices are known to cause reef die-off, coastal ecological research shows that agricultural run-off has the most deleterious effect on coral (Marion *et al.*, 2005).

Farming and Fertilizer in Batukaru

The Batukaru area is situated at the top of Bali's "rice bowl" on the periphery of the lowland rice terraces where Green Revolution technologies were more systematically promoted. Whereas in downstream areas the government legally mandated double or triple cropping of hybrid rice, further upstream farmers often adhered to the ritual schedules that matched the growing cycle of native rice (Lansing, 1991). During field research, colleagues from the agricultural office often commented on the contrast

⁸ In Tabanan (subak Jegu), field trials showed higher yields when urea dosage was reduced from 300 kg per hectare to 150 kg per hectare and organic fertilizer was added (see Lansing *et al.*, in progress).

between the more traditional farming practices in Batukaru, and the more intensive, continuous cultivation found in other areas of Bali. This observation is also reflected in the quantitative data, which show that the majority of farmers plant local rice varieties, which take longer to mature and are less responsive to fertilizers (Table 2). Hybrid varieties are more commonly planted during the short dry season.

Table 2. Seasonal cultivation of rice varieties in Batukaru, by farmer⁹

	Wet (long) season		Dry (short) season	
	n	%	n	%
Hybrid rice (<i>beras baru</i>)	15	9	64	42
Local rice (<i>beras Bali</i>)	140	90	87	57
Both	1	1	2	1
<i>Total (N)</i>	<i>156</i>	<i>100</i>	<i>153</i>	<i>100</i>

Compared with other studies of fertilizer use in Bali and Indonesia, farmers in Batukaru report lower applications of urea, an average of around 185 kilograms urea per hectare in both the wet and dry farming seasons.¹⁰ Throughout the area, farmers typically use chemical fertilizers alongside traditional practices, such as incorporating rice stalks and using livestock manure when it is available, thereby reducing their dependence on urea. However, the range of urea use varies dramatically. A small number of farmers report no

⁹ Wet months are generally defined as those with an average monthly rainfall of 200 mm or more; dry months receive less than 100 mm of rainfall (Whitten *et al.*, 1996). In Batukaru, farmers describe a six-month long wet season (late October to March) when they typically plant local Bali rice (varieties include: *Cicih, Mansur, Tahun, Merah, Ketan Hitam*). Hybrid varieties (*e.g.*, IR64) planted between April and September, mature in three months. Some farmers intercrop with soybeans, peanuts, corn, sweet potato, and onion (referred to as *palawija*).

¹⁰ Interestingly, farmers report similar urea applications in both wet and dry seasons, regardless of rice variety.

urea use at all.¹¹ At the other end of the scale, a few farmers report upwards of 750 kilograms per hectare, more than three times the standard recommendation. Although the survey did not collect data on trends in fertilizer use, farmers remark in informal interviews that there has been little change since the 1980s.

Based on government recommendations, I designated three categories of urea use in Batukaru. As Table 3 shows, just over half of all farmers in the survey (N=153) use less than 200 kilograms urea per hectare, while about one-quarter apply 250 kg per hectare or more.

Table 3. Urea consumption in Batukaru, dry season (kg/ha)¹²

	n	%
High (≥ 250 kg / ha)	42	27
Medium (200-249 kg / ha)	25	16
Low (≤ 199 kg / ha)	86	56
<i>Total (N)</i>	<i>153</i>	<i>100</i>

Findings on urea use based on these categories suggest variation among the seven subak sampled in Batukaru. Notably, 40 percent of farmers in the high application group belong to subak Piling, representing more than half of the 31 farmers surveyed in Piling. Another four farmers from Piling apply a medium dose of urea per hectare, while there are no Piling farmers in the low urea consumption category. In contrast, low users are more broadly distributed across the sample. The majority of low users are concentrated

¹¹ Five farmers report no urea use in the wet season, and 12 in the dry season.

¹² I use urea applications reported during the previous dry season, because during this season, farmers are more likely to plant hybrid rice, commonly associated with technology packets and chemical fertilizers. The calculations are based on 153 farmers; three farmers in the survey are excluded as extreme outliers.

in four subak: Bedugul (comprising, 23% of low urea users); Gunung Sari and Soka Candi (each comprising 15%); and Wangaya Betan (13%). Nearly all of the 12 farmers sampled from Wangaya Betan apply relatively low doses of urea. It is likely that the lower use of urea-based fertilizer in Wangaya Betan reflects the impact of the ongoing organic farming project initiated in that subak (see chapter 5). Survey findings suggest that most farmers across the study area, including subak Wangaya Betan, are unaware or uncertain that irrigation water carries valuable nutrients to their sawah. While 41 percent indicate that water provides *nutrisi* (nutrition) to the fields, 39 percent believe that it does not and another 20 percent do not know (*tidak tahu*).

Despite relatively low urea use and favorable soil conditions compared with other areas, farmers in Batukaru perceive adverse changes in the condition of the soil. When asked about changes in soil characteristics observed over the past 30 years, nearly half of farmers surveyed in Batukaru reported a decline in the presence of beneficial microorganisms (*cacing tanah*) and almost two-thirds have observed a decline in the diversity of fauna that populated paddies prior to the introduction of chemical fertilizers and pesticides (Table 4).¹³

¹³ Although half to two-thirds of the farmers surveyed report declines in soil characteristics (

Table 4), when asked to rank the most pressing problems facing rice production, only eight percent (n=12) identify loss of soil fertility as the primary challenge (Table 5).

Table 4. Changes in soil characteristics**Over the past 30 years, what has changed in the condition of (N=156):**

	Improved		No change		Decline	
	n	%	n	%	n	%
Soil micro-organisms	27	17	56	36	73	47
Paddy fauna (fish, eels, mollusks)	22	14	34	22	100	64

Many people I interviewed—farmers, priests, agricultural extension agents, academics—recounted memories of paddy fields prior to the Green Revolution. Farmers recalled diverse integrated systems rich with insects and worms, fish, mollusks, eels, and ducks, all of which provided alternative food sources. Often, people reference the taste, color, or some other sensory characteristic of local rice varieties (*padi Bali*) cultivated without chemical inputs. A farmer and *bendesa adat* (the customary head of village) in Wongaya Gede remarked:

The taste of paddy before using urea was better than after using urea. It smelled better too. With the same amount of urea, paddy *mansur* [hybrid rice] results in more quantity than local paddy, but local paddy has better quality.

Across Indonesia, there is growing support for reducing the use of chemical fertilizers and shifting to organic farming to counter the problems associated with excessive use of chemical fertilizers over the past 40 years (chapter 5). Areas such as Batukaru, where pre-Green Revolution practices are relatively common and farmers are experimenting with new methods of organic farming, may offer insights into this transition.

B. Tourism Development

In the early 1970s, concurrent with the advent of the Green Revolution in Bali, the government of Indonesia and the World Bank developed a master plan for tourism that concentrated development in the southern tip of the island, in the district of Badung. Over the next two decades, Bali's governors designated an additional 30 tourism development areas throughout the island. By the early 1990s, zoning regulations targeted one-quarter of Bali's land area for tourism development and growth in the sector escalated rapidly. The expansion was driven in part by pressure from other districts, which also sought tourism receipts. It was also attributed to deregulation of the banking sector, which facilitated private domestic investment in tourism.

In 1980, an estimated 300,000 international tourists visited Bali. Official statistics indicate that number increased to one million in 1991, and to two million by 2000. Tourist has continued to increase. Although the number of visitors decreased in response to the Bali bombings of 2002 and 2005, the tourist sector rebounded quickly with an estimated 2.7 million foreign and domestic visitors by 2007 and 4.8 million by 2008 (1.9 million foreign) (Schulte Nordholt, 2007; BPS, 2008; Wiranatha, 2010), exceeding the island's population of around 3.5 million.¹⁴

Ironically, the once sought-after growth of tourism in Bali now threatens to destroy the very cultural and ecological resources that have for so long attracted visitors to Bali. The rapid expansion of tourism has had an immediate and lasting effect on paddy

¹⁴ After the bombing of the tourist area in Kuta in 2002, the flow of tourism revenue stopped abruptly. Attention turned to the vulnerability of Bali's tourism-based economy and the need to develop agriculture in tandem with tourism (see MacRae, 2005).

cultivation and the subak in three main ways: a shift from an agrarian to a non-agricultural based economy, increasing conversion of farmland to other uses, and a growing demand on limited water resources.

Agrarian Change and the Next Generation of Balinese Farmers

A major consequence of the expansion of the tourist economy is that it has enticed many people, especially young people, away from agricultural areas and agricultural livelihoods. The Balinese economy has shifted from one that is agrarian-based to one that is derived directly or indirectly from tourism. By 2005, over half of Bali's residents lived in urban areas, compared to about one-quarter in 1990. Between 1970 and 2007, the proportion of the population in the agricultural sector dropped from 57 to 36 percent. In present day Bali, 29 percent of the provincial GDP is derived from tourism. This is now the largest single sector in the economy, followed by agriculture, which accounts for 19 percent of the island's GDP. The rapid expansion of the tourist sector has fueled an average annual economic growth rate of around eight percent and the emergence of Bali's middle class—owners of small hotels, restaurants, art shops, and tour businesses (Schulte Nordholt, 2007; BPS, 2008). Direct or indirect (*e.g.*, handicraft wood and silver, furniture and garment producers) involvement in tourism is estimated at 60 to 70 percent of the workforce (Schulte Nordholt, 2007). Tourism now provides a living for thousands of Balinese, to the point where, as Vickers (1989: 200) comments, “poverty in Bali is associated with lack of access to tourist income.”

While tourism development has created new off-farm employment opportunities and increased prosperity for Balinese overall, it has also sparked controversy about where and to whom the vast majority of benefits accrue. Tourism development, which has consumed large tracks of farmland, is largely associated with the increased participation of external investors in Bali's tourism economy. In 2004, the *Bali Post* reported the startling claim that 85 percent of the 150 trillion Rupiah (approximately USD 16 billion) in Bali's tourism assets is owned by outside investors (Warren, 2009).

As a result of the economic transition, few young people in Bali today—and particularly those in more affluent or tourist areas—choose farming as a livelihood (MacRae, 2011). Working in south-central Bali, Lorenzen and Lorenzen (2011) document the outmigration of young people from the rice paddies to off-farm employment in the tourist sector. Most farmers are now over fifty years of age (MacRae, 2011). The demographics of farmers surveyed in Batukaru are typical of this trend. About 55 percent of respondents are 50 years of age or older and only around 13 percent are 35 years old or younger. Farmers typically expressed the sentiment that young people leave for the city to study, work, and live, returning only for temple ceremonies or if they are unsuccessful in the city. The customary head of Wongaya Gede village observed that when youth do return, they choose not work in the fields: they “don't even know the names of farm tools.” One farmer in subak Jatiluwih, the father of a 17 year old, remarked that though his son will return to the village, he won't be a farmer: “The life,” he says, “is too heavy, difficult, and the return is not good.”¹⁵ During a focus group

¹⁵ “*Hiddup terlalu berat, sulit, hasil tidak cocok.*”

discussion with youth in Gunung Sari (Batukaru), one young man commented that “being a farmer is the last choice.” The survey of farmers shows that they consider lack of interest in farming among youth one of the main challenges to the future of the subak in Bali (Table 5).

Table 5. Primary challenges facing the subak in Bali

	Number of Farmers (n)	Percent
Water shortages	43	28
Land taxes	28	18
Lack of legal protection for farmland	20	13
Lack of interest in farming among youth	18	11
Tourism development	13	8
Loss of soil fertility	12	8
Small financial return	9	6
Other	13	8
<i>Total (N)</i>	<i>156</i>	<i>100</i>

Although farmers may lament this trend, they still see non-farm activities as the best future prospects for their children. In the highly touristed area of Ubud, Bali, Macrae finds that farmers routinely advise their children to pursue livelihoods outside of the farm sector (MacRae, 2011). In Batukaru, where currently, farming continues to be the primary activity, only half of farmers surveyed indicate that they want their children to become farmers. Nearly 60 percent expect that their children will work in off-farm employment. When asked what vocation they seek for their children, farmers commonly aspire for their children to become doctors or private sector entrepreneurs.

Investment in education is one pathway alternative livelihoods. Among farmers' first-born children 18 years of age or older in the Batukaru sample (n=112), nearly 60 percent have completed high school and another 22 percent have gone on to higher education, typically in the regional center of Tabanan city or the provincial capital of Denpasar.¹⁶ Throughout Bali, there is growing concern that the future of rice farming and the subak may be jeopardized, as farming is no longer the primary economic activity of most Balinese. In many areas, particularly those closer to urban centers, the younger generation is increasingly unwilling to "work in the mud" (Lorenzen and Lorenzen, 2011: 40).

However, since the Bali bombings of 2002 and 2005 and the subsequent impact on the tourism sector, it has become more common for educated young people to return to their home village after school. In Batukaru, for example, young people we interviewed who have returned to farming consider it a more stable livelihood than insecure employment in the city. While youth expressed the same concerns that are common to older farmers (*e.g.*, land and water scarcity, pests and diseases), many with whom we spoke exude a sense of optimism about the future of rice farming using organic methods and new strategies for water conservation. They also highlight the potential of community-based agro-tourism as a way to diversify their activities. While the majority of youth in Bali seek alternatives to agriculture, there is a cadre of young people who see potential for new technologies (*e.g.*, a desire for information technology), training, and external resources (*i.e.*, government) to support farm-based livelihoods.

¹⁶ This finding contrasts with the educational attainment of their parents, about 20 percent of whom never attended school or did not finish elementary school.

Land Conversion and Fragmentation

A second major outcome of tourism development is the conversion of rice terraces to non-agricultural uses. Until recently, tourism and urban development have been centered in the southern districts of the island. Rapid and unregulated development in southern Bali is creeping north to the upper reaches of the paddy fields as tourists search out the “Real Bali.” Consequently, farmers increasingly seek opportunities to benefit from the tourist boom through the sale of their most valuable asset: land. Of about 82,000 hectares of irrigated paddy in Bali, over 1,000 were converted to non-agricultural use in 2008, an increase from 640 hectares in 2006 (IMCT, 2011). Over the past 20 years, an estimated 15,000 hectares of sawah have been sold and converted (Sutawan, 2005). This trend is expected to continue. A 2008 Jakarta Post article entitled *Bali Real Estate – Safe and Profitable* reported that even during a global economic crisis, Bali tourism and real estate development “enjoyed record demand.” According to property experts, the value of “luxury” villas in southern Bali was expected to increase 15 to 30 percent per year.

As land prices soar, sale of land becomes an increasingly attractive source of income to hard-pressed farmers. Until about 1990, most farmers in Bali were able to live comfortably by cultivating rice. Since that time, living and production costs have steadily increased, while the price of rice has not. The head of a Batukaru subak remarked, for example: “All farmers here are debtors.”

One of the problems confronting farmers is that of increasing land taxes. Among farmers surveyed in Batukaru, 18 percent ranked land taxes as their greatest challenge, making this the second most prominent problem after water shortages (Table 5). In Bali,

land taxes are based on market value, rather than current use. As Warren (2009) writes, this method of valuation introduces extreme distortions where tourist or real estate development drives land prices far beyond what low-income agricultural producers can afford. Rising land values and the increasing cost of living in Bali both pressure and entice landowners to sell. The windfall of opportunity afforded those in attractive locations “may bias real life decision-making against collective solutions to social and environmental issues” (Warren, 2009: 205). Even in rural and relatively remote Batukaru, 12 percent of farmers surveyed have sold land in recent years. During the 2008-2009 research period, 16 hectares of rice terraces in subak Wangaya Betan and Peseletan (Batukaru area) were demarcated as the site of a proposed tourist retreat known as the *Kesehatan Tradisional Tingkat Dunia* (Traditional Healing World Centre).¹⁷

The rice terraces in question, and indeed all the terraces in the Batukaru area in which this research was undertaken, are located within government designated Green Zones or *jalur hijau*, where large scale tourism development is prohibited.¹⁸ Recently, however, the area has been the target of proposals to override these existing land use regulations and allow such development. Non-governmental and government observers anticipated that benefits from the proposed development in Wangaya Betan, like the majority of such schemes in Bali, would accrue primarily to outside investors.¹⁹ In 2008 and 2009, conflict surrounding the project in Wangaya Betan was beginning to percolate within the

¹⁷ Together, subak Wangaya Betan and subak Peseletan comprise 63 hectares.

¹⁸ Government of Tabanan Regency Decree No. 9, 2005.

¹⁹ The Traditional World Healing Centre is proposed by the corporate entity PT Bali Permata Indah (‘Bali’s Beautiful Jewel’). Ownership of PT Bali Permata Indah was difficult to trace out conclusively, but project documents state the company is held by representatives from 12 countries in Asia, the Pacific, Africa and Europe, as well as the United States and Australia (PT Bali Permata Indah, 2006).

community. The controversy centered primarily on the reallocation of water resources to supply the retreat, rather than the loss and fragmentation of sawah.

Throughout Bali, the sale of paddy land has resulted in rapid conversion from rice fields to bungalows and the subsequent fragmentation of terraces. Yet in the Batukaru area, the majority of farmers I interviewed do not consider the sale or conversion of sawah to be a significant problem at present. For the most part, customary subak rules—*awig-awig*—in Batukaru permit the sale of land. In some cases, *awig-awig* restrict the sale to other members of the same subak or require consensus among subak members before a farmer can sell sawah. More commonly, *awig-awig* specify that the *function* of the land cannot be changed, as reported by 40 percent of farmers surveyed. A farmer in subak Jatiluwih captured the sentiment of many: “*Jual sawah boleh; alih fungsi, tidak boleh*” (“Sell land, you may; change its function, you may not”). This farmer and others, however, express their desire for more tourism development outside of the Green Zones. They also recognize the necessity of creating laws or customary *awig-awig* and enforcement to protect rice terraces and the subak in the future, a recurrent theme in interviews (and see Table 5).

Given the trend throughout Bali and recent changes in the Batukaru area, this observation is prescient. Despite the establishment of Green Zones throughout the island and the desire of farmers to protect their land and subak, the sale or lease of farmland for residential or commercial building have become options that are more lucrative than farming (Muhajir, 2009; MacRae, 2011). Farmland along main roadways of Batukaru is dotted with small signs announcing “*tanah dijual*” (“land for sale”) and villa construction

continues at an alarming rate. The prevailing sense is that outside investors, such as those behind the proposed Traditional Healing Centre, are eager to buy (*The Jakarta Post*, 2008; Sardi, 2009). While there is no central source for data on real estate development, *The Jakarta Post* estimated in 2009 that at least 300 new villas would be constructed in remote and urban areas of Bali from 2009-2011. As the *Post* journalist Claudia Sardi (2009) acutely observes, development is “impossible to overlook and equally impossible to quantify.” As land is taken out of rice production, there is a risk that the subak will devolve into a symbolic institution without the traditional functions of water and land management.

Water Shortages

A third major impact of tourism and urban development is the demand on increasingly limited water resources. It is estimated that Bali has an average per capita water reserve of 455 cubic meters per year (1993 estimate), 53 percent of which is used annually (equivalent of 319 m³/capita/year). In Batukaru, farmers reported that they are experiencing water shortages for the first time in their lifetimes. For over 40 percent of farmers surveyed, irrigation water is insufficient for rice farming during the dry season, especially during the months of July to September. Whereas the average Balinese family consumes 100 liters of fresh water per day, tourists in a luxury hotel room use an average of 200 liters per day (Suasta, 2001). Water consumption is expected to increase 70 percent across Bali by 2025 (2005 estimate), attributed primarily to tourism growth.

In a study of water conflicts among different user groups in Bali, Strauß (2011) argues that the main problem for water policy in Bali is the unregulated and uncoordinated use and allocation of water. The lack of oversight is coupled with the tendency to privilege short-term financial gains associated with tourist and commercial development over agriculture, despite the importance of rice farming for Bali and Indonesia. In the rural Batukaru area, as elsewhere in Bali, water resources are increasingly directed to urban centers and tourism development. However, only eight percent of farmers identify tourism as the major problem for rice farming (Table 5). This result corroborates findings of Strauß (2011), in which farmers criticized top-down planning and water allocation processes, but not tourism itself—an important source of income for many farming households in southern Bali.

The increasing demands on water resources are compounded when the projected effects of climate change are taken into consideration. Climate change studies predict the increased probability of a consistent delay (30-day) in the monsoon onset, similar to what is experienced in El Niño drought years. During such years, rice yields decline in Bali by an average of 11 percent (Naylor *et al.*, 2007). Without new strategies, recurrent drops in yield in Indonesia's rice bowl will have a significant detrimental effect on national food security.

In southern Bali, where water consumption is greatest, subak heads report that water distribution is the main constraint to rice farming and the principal driver of land sales and the shift to non-agricultural livelihoods (Strauß, 2011). Similarly, in Batukaru, where river and spring-fed water resources have been abundant in most years, nearly 30 percent

of farmers surveyed perceive water shortages as their primary challenge (Table 5). The Ministry of Agriculture in Bali, is acutely aware of increasing water constraints, is currently conducting research and training programs to encourage minimal and intermittent water use in paddy farming. The majority of farmers surveyed in Batukaru irrigate paddy intermittently, while 15 percent provide continuous irrigation.

The loss of water resources is a critical issue for farmers and the subak, not only because water is a productive asset, but also for its highly significant symbolic and ritual value. The Balinese Hindu religion is known as *agama tirtha*, or the religion of Holy Water. Beginning in the ninth century, temples were constructed near natural springs to create sacred bathing pools. Rituals performed inside the temples could transform spring water into holy water, or *tirtha*, imbued with the essence of the temple's god. Over time, the principal sacrament of Balinese religion developed into the exchange of worshippers' offerings to a temple god for the blessing of tirtha that could be sprinkled on them, their families, fields, houses, and livestock. Today, the term tirtha refers not only to a spring, but the holy water that flows from it (Lansing, 2006: 52).

The overexploitation and reallocation of water resources in Bali are serious threats to the future of rice farming and the subak. Traditionally, conflicts over water have been negotiated within and between subak, whose primary role is the equitable and efficient distribution of water resources. As authority over water becomes more diffuse and water shortages more common, the capacity of the subak to manage this resource will be tested. Moreover, water scarcity has led and will continue to lead to land conversion and fragmentation. The issue of water shortages and the conflicts that surround it—as in

Wangaya Betan, for example—is not only material and economic in nature. In Bali, water must be understood at the symbolic level. Water is the “life source” for productive agriculture and the foundation of the ritual and belief system (Lewis and Lewis, 2009; Strauß, 2011).

C. Deforestation

In addition to the impacts of the Green Revolution and tourism, the loss of forest cover in Bali is another problem that threatens the future of the subak. Presently, Bali features an estimated 130,000 hectares of forested land (BPS, 2008). The forested highlands are home to the island’s major lakes: Lakes Batur, Buyan, Bratan, and Tamblingan. Bali’s forested areas serve a critical function in the water catchments for the springs and rivers that feed the irrigated rice terraces. According to research conducted by Bali’s Udayana University Center for Environmental Studies, about 20 percent of this forested land is critically damaged and another 25 percent has been diverted to other functions (Lewis and Lewis, 2009; Warren, 2009). Forest loss in Bali during the last century is attributed largely to increased demand for construction materials, including fuel wood for the manufacture of bricks and tiles, and the opening of forest land for cash crop production (Whitten *et al.*, 1996). In Batukaru, 26 percent of farmers surveyed indicate the condition of the forest has declined in their lifetime, some positing this deterioration results from overdevelopment. According to the *Bali Post* (August 28, 2006), even in the northern district of Buleleng, close to irrigation headwaters, declining water levels in mountain lakes dried up many rivers, resulting in

the withdrawal of 741 hectares from rice production due to lack of irrigation water (Warren, 2009). The Governor of Bali, I Made Mangku Pastika, who took office in August 2008, articulated the widespread concern over forest loss and its relationship to water availability in this excerpt from the *Bali Times* newspaper (October 4, 2008):

We are very concerned about environmental problems in Bali, because our forests are now only 22 percent of the whole area in Bali—according to our laws there should be at least 30 percent—and of this 22 percent only 59 percent is in good condition and can function as a real forest.’ Demand for wood was three times what legal logging could supply, so that even young trees are cut down, eating into the remaining forest, Pastika says. ‘The next problem this creates is water. Now from 400 rivers there are 260 dry. We have 140 left, but they are in the process of drying.’ Bali’s environmental balance is under threat, he says.

The connection between forest and farmland is clear to farmers and those living throughout the Batukaru area. In interviews about environment change in Batukaru, people often expressed a sense of collective responsibility for the sustainability of rice farming. As a local government official in Jatiluwih, situated where the forest meets the irrigated rice terraces, emphasized:

It [the sawah] needs water coming from the area up here. If we do not keep it by making the Green Zone regulation this area will lose its capability to absorb water and consequently the rice fields located in the lower area will lack water. The rice will be gone... We cannot just think of our needs by cutting trees in the forest, because the people living in lower areas will have a lack of water and in the longer term. We will all suffer from it.

Farmers throughout Batukaru often refer to the importance of the forest for farming livelihoods and the subak. As a farmer from subak Wongaya Gede commented, for example, “If the forest is good, the water must be good too.” Farmers throughout the area consider themselves the stewards of a sacred and protected forest. This relationship

with forests is manifest in subak rituals, as well as local norms that regulate forest use. To ensure healthy forests, subak in Batukaru perform periodic ceremonies to honor and give thanks to forest gods. These ceremonies give tangible, ritual form to the sense of interconnectedness among subak, forests, lakes, and rice terraces. As a farmer in subak Soka Candi described:

To maintain the forest and the lake that have a close connection with subak, we regularly conduct an annual ceremony. The big ceremony is held every three years. Every three years, we sacrifice animals in the ceremony—like deer, squirrel, buffalo. Farmers from Soka prepare the offerings using the deer, while farmers at [associated temple] Petali prepare the offerings for.... the lake Tamblingan [considered the source of irrigation springs].

Farmers routinely enter the forest to harvest non-timber products, such as edible ferns (*pakis*). In Batukaru, the cutting of trees is restricted by government regulation and is a local taboo; farmers reportedly obtain sufficient firewood from their private “garden” lands (*kebun*). Failure to observe restrictions on tree-cutting has ramifications. As subak members nodded affirmatively, the priest of Pura Besi Kalung, for example, recounted the story of one villager who entered the forest to cut a tree and was swiftly assaulted by a swarm of bees in retribution for this prohibited act.

Despite regulations at the government and local levels, the forests of Bali receive inadequate protection (Whitten *et al.*, 1996). In addition to the longer-term issue of over logging in Bali’s forests, the island now faces the problems of construction and tourism development within forest boundaries. In February 2009, the Indonesian State Minister for the Environment Rachmat Witoelar voiced concern for “plans to develop massive projects in the island’s conserved and protected areas, including water catchment areas”

(Atmodjo, 2009). Broad concern for this situation is exemplified by the ongoing protest against concessions granted to developers in the protected forest near Lake Buyan. Reportedly, two different companies, PT Nusa Bali Abadi and PT Anantara, received permits from the Forestry Ministry in Jakarta and the Buleleng regency to begin villa construction in this sacred site. The villas were conceived to offer tourists “a real forest experience” (Sardi, 2009: 9). Though the area is protected by a 2005 bylaw banning infrastructure development at sacred sites and required approval from the governor of Bali was not granted, the companies initiated construction with consent from the central government, leading to public outcry from a broad coalition.²⁰ Protesters included the Forum for the Protection of Sacred Sites and Bali High Priests, the provincial legislature, environmental non-governmental organizations, and community groups throughout Bali (Erviani, 2009, 2009b). The Balinese overwhelmingly viewed the tourism development in the Lake Buyan area as an affront to religious and cultural traditions. As discussed in chapter 2, Balinese Hindus revere the lakes as a sacred site of Bhatari Danu, the goddess of water and fertility.

The case of Lake Buyan is illustrative in three ways. First, it demonstrates that the extent of tourist development in Bali has reached the level of widespread public protest. According to Governor Pastika, damage to the lake had reached a critical point. In response to the crisis, Pastika ordered an expert panel to convene and propose recommendations for lake restoration. “What’s certain,” Pastika stated, “is that we have to move fast to save Lake Buyan” (Erviani, 2009: 9). Second, the case highlights the

²⁰ Regulations of Bali Province No. 5 (2005) Section 19, clarifies zoning for protected sacred sites, based on customary awig-awig.

strong connection between forests, lakes, and spirituality—all inextricably linked to the perpetuity and sanctity of the subak. According to observers, the call to protect Lake Buyan is grounded in Balinese religious identity and conceptions of the sacred. Third, the situation at Lake Buyan illustrates another critical problem facing Bali and the subak today, that of overlapping spheres of authority with the devolution of power to the local district level. Despite a rejection of building requests from the office of the provincial governor, investors received permission from the central government in Jakarta and the regency. It has become increasingly difficult in Bali, to formulate coherent development or conservation strategies as a result of the multiple and decentralized layers of authority, each with their respective interests.

D. Decentralization: *Otonomi Daerah*

The issues of political reform and decentralization underlie the problems of tourist development and exploitative resource extraction described above. They emerged as common themes, in discussions with a range of informants and provoke much discussion in the popular press. After the fall of Suharto and the New Order regime in 1998, the newly elected President Wahid embarked on the challenge of rebuilding Indonesia's marginalized civil society, an initiative that was furthered by Wahid's presidential successors. Decentralization, democratization, and regional autonomy are primary tenets of *Reformasi*. This reform agenda is encountering considerable challenges, particularly evident in the province of Bali, where administrative boundaries largely correspond with the old system of kingdoms. Precolonial Bali was ruled by a constellation of small and

fractious kingdoms that competed for political power. When Dutch colonial rulers took hold of most of Bali in the early 1900s, the kings were deposed. They were later reinstated as indirect rulers on behalf of the Dutch in the 1930s. Bali's contemporary administrative regencies (*kabupaten*) are based on these former dynasties (Schulte Nordholt, 1996; MacRae and Darma Putra, 2007; Lewis and Lewis, 2009).

In the spirit of Reformasi, national Law Number 22 of 1999 was enacted to devolve administrative authority and transfer funds to local governments, primarily at the regency level. The provincial level was strategically excluded in an effort to avoid separatist conflicts based on ethnic, or linguistic, or religious affiliation (MacRae and Darma Putra, 2007). With eight regencies, the relatively small island of Bali is, as Schulte Nordholt (2007: 41) observes, "rather over-administrated." The main problem, noted by Schulte Nordholt, is that regional autonomy, or *otonomi daerah*, has created what are often referred to as "little kingdoms" that prioritize their own interests and income streams over the integrity of the island-wide province. Indeed, this theme commonly emerged during field research on the underlying causes of environmental problems in Bali. Competing regional factions tend to disregard coordination efforts at the level of provincial government. Compounding the lack of coordination, there is an uneven distribution of financial revenue, due in large part to the hotel and restaurant tax being concentrated in the wealthy tourist regencies. According to the economist Nyoman Erowan, regency leaders collect 10 percent of taxes from hotels and restaurants, which gives them a strong incentive to seek investors in the tourist sector (Sardi, 2009). Despite new provincial zoning laws that limit or call for a moratorium on new hotels and villas, construction

proceeds with concessions issued in Jakarta and by the kabupaten (*e.g.*, Lake Buyan, described above) (Erviani, 2008, 2009c). Development planning is driven by the drive to increase regional income streams (*pendapatan asli daerah*).

In Bali, regional autonomy has fostered governance mechanisms that are ineffective for grappling with pressing island-wide environmental problems such as pollution, water shortages, deforestation, and land conversion. Unlike the subak and temple network, for example, which self-organizes to manage equitable irrigation distribution at the watershed level, administrative interests have pursued short-term financial returns that undermine longer-term sustainability at the provincial level. Efforts to advocate for special autonomy (*otonomi khusus*) of Bali province have been ongoing in Bali for the past decade (see Supartha, 2007). Supporters for special autonomy argue that this status would give the provincial administration more authority to govern Bali in an integrated, island-wide manner and reduce control of the central government over tourism development, as well as cultural and environmental resources. As the crisis of overdevelopment becomes increasingly acute and the tenor of public resistance heightens, political momentum for new pathways of island-wide governance are emerging and gaining traction. The UNESCO Cultural Landscape project is one such example.

E. The Challenge to Resilience

Nyoman Sutawan articulates a critical difference between the transformation of the Green Revolution in the 1970s and the current crisis in Balinese rice farming. He equates

the disturbance of the Green Revolution to a technological disruption—that is, one that directly affected the technical practice of paddy cultivation. Sutawan contends that today, in contrast, the subak faces problems that penetrate multiple, intertwined, and multi-scalar aspects of rice farming; the decline in soil quality triggers ever-increasing use of costly chemical inputs and the rising cost of inputs and land taxes relative to the market value of rice creates economic disincentives for farming. Simultaneously, the payoff for the sale of farmland presents an opportunity for economic security. Land conversion and water shortages, exacerbated by climate change predictions, present new and critical threats to the future of the subak. The subak is also facing the absence of a new generation of Balinese farmers, which will profoundly affect the productive and ritual traditions of the subak institution. Moreover, according to Sutawan (2004), new values have arisen in Balinese society that prioritize economic gain over cooperation and equity, values that have long characterized the subak.

For over a millennium, the subak has adapted to political and technological upheavals to emerge as an exemplar of resilient institutions. Could it be that the subak and Bali's agro-ecosystem have arrived at a tipping point? Ultimately, Bali faces a problem of governance. This is not to oversimplify the complex, entangled, and entrenched challenges of over-development, resource exploitation, and demographic change confronting the subak and the Balinese, more generally. Rather, it is to highlight the urgent need for innovative and contextually appropriate mechanisms and policy incentives that will enable the subak to continue the long-term project of cooperative governance and effective resource management.

According to Sutawan (2004: 6), the subak should not be perceived as “static or never changing and completely self-sustaining *without any external assistance*” [italics mine]. In Batukaru, subak are forging new alliances and experimenting with novel strategies that have emerged as local responses to Bali’s problem of social-ecological governance (chapter 5). While the future of the subak is uncertain, the establishment of new institutions modeled on subak governance holds promise for sustainable paddy livelihoods and landscape conservation in Bali. The UNESCO Cultural Landscape model, presented in chapter 6, represents a source of external support for the subak and paddy-based livelihoods, one that builds on local initiatives and is organized around Balinese Hindu cosmological orientation.

CHAPTER 4 “BALI IS BALI FOREVER”: COSMOLOGY AND CULTURAL HERITAGE CONSERVATION

In October 2008, a large meeting room at Bali’s Department of Culture filled with officials representing multiple government units, along with academics and experts in Balinese culture, agriculture, and the environment from Bali and abroad. The Department of Culture, the lead coordinating agency for Bali’s UNESCO World Heritage Cultural Landscape nomination, convened the meeting to discuss the status of the nomination proposal. In June of that year, UNESCO officially deferred the nomination, in part to allow the Government of Indonesia and Bali’s planning team to more fully articulate in the nomination dossier the close relationship between the rice terraces, the water temple networks, and the subak. While the nomination did include these three components, its focus was somewhat different. Rather than specifically propose these three interconnected aspects of the Balinese cultural landscape as justification for the proposed site, the dossier nominated a “unique Balinese cosmological doctrine.”

For the Balinese, the Cultural Landscape of Bali Province was conceived as a significant and tangible manifestation of the Balinese philosophy of *tri hita karana*, or “the three causes of prosperity or the good,” which dictates that prosperity or happiness can only be achieved through harmonious relations among humans, the natural world, and the divine. During the meeting at the Department of Culture, a central topic of the discussion was the prominence of *tri hita karana* in Bali’s cultural and natural heritage. As the discussion drew to a close, representatives from Bali’s government departments of

culture and tourism, archaeology and history, agriculture, forestry, environment, and public works stood in turn to voice their support for nominating the subak, rice terraces, and water temples as World Heritage on the basis of their embodiment of the philosophy of tri hita karana. In fact, it was the concept itself that helped foster collective action among these diverse sectoral units.

Today in Bali, reference to tri hita karana permeates discourse around the environment and development—in the media, in seminars, and in public discourse. It is commonly acknowledged as the driving principle for the Balinese in creating and maintaining their landscape over the centuries. But while tri hita karana is indeed grounded in ancient Balinese cosmology and Hinduism, this specific wording first appears in the 1960s and 1970s. Only in the past decade has its usage become widespread. By the early 2000s, the concept had emerged as a focal point for strategies to cope with dramatic environmental change. It was soon adopted as the organizing principle for Bali's UNESCO World Heritage Cultural Landscape nomination.

The concept of tri hita karana exemplifies the adaptive capacity of the Balinese to create and incorporate new forms of cultural meaning from an ancient worldview, and apply these forms to shape identity, institutions, and concrete strategies. Facing unprecedented environmental degradation wrought by intensive use of agrochemicals and unregulated tourist growth, many Balinese have collectively invoked a contemporary form of this Balinese Hindu concept as a guiding philosophy to restore social-ecological-spiritual harmony. Richard Fox, in writing on the ideology of Gandhian utopia, speaks of such developments as cultural experiments or innovations: “cultural meanings develop

as human actors originate ideas about their society out of cultural meanings already constituted and then experiment with these ideas” (Fox, 1989b: 16). In this chapter, I first review the role of cosmology and value systems in theories of adaptive governance. The first section discusses the origins of tri hita karana in Balinese cosmology and its meaning in Balinese culture. Then, I describe the ways in which the concept of tri hita karana was mobilized as an ideology supporting social-ecological resilience in Bali. While tri hita karana is now invoked as an expression of the underlying foundation of all aspects of Balinese life, it is more particularly or specifically mobilized to refer to the relationship between the subak, water temples, and rice terraces. As such, the concept came to frame the collective vision for Bali’s World Heritage initiative and provide a common arena to coalesce broad support for cultural landscape management.

A. Worldviews and Adaptive Governance

In the practice of conservation and development, the role of worldviews and values are often overlooked (see Runk, 2009: 456-57).²¹ The early experience of the Green Revolution in Bali provides one such example. In his 1932 ethnography of Bali, V. E. Korn, a Dutch colonial official, observed: “there is no doubt that the water in the lakes belongs to the gods, and filling the irrigation canals is up to them” (Korn, 1932 in Lansing, 2006: 61). However, the significance of the water temple network and what Lansing (2006: 62) calls a “mythical imagery of a cosmic mountain” at the center of

²¹ Although there is significant literature on indigenous cosmologies and conservation practices (*e.g.*, sacred ecology; see Berkes, 1999), extralocal conservation and development initiatives tend to disregard local beliefs or assumptions about reality and the world and the value systems that accompany them. For a discussion of ecological worldviews and environmental values, see Sterling (1991) and Dietz *et al.* (2005).

Bali's irrigation works were invisible to development officials implementing the island's agricultural and irrigation projects in the 1970s and 1980s. As a result, the system nearly collapsed in the wake of pest outbreaks and water shortages brought on by "chaos" in irrigation and planting schedules (see chapter 3.B).

The literature on adaptive governance makes limited reference to the importance of worldviews and values for adaptive co-management of complex systems. In a general sense, work in adaptive co-management recognizes the relevance of "ecological" worldviews—seen to conceptualize the cosmos in terms of complex social-ecological relationships—for adaptive governance approaches (Berkes *et al.*, 2000). One theme in the literature is the challenge faced by adaptive co-management in reconciling diverse worldviews and value systems (Houde, 2007). In their research in Sweden's Kristianstads Vattenrike Biosphere Reserve, Olsson *et al.* (2007: 5) identify the importance of a "common denominator" to connect people with diverse interests, develop a common vision and goals, and mobilize broad support for change. Similarly, drawing on research in ecosystem management in Sweden and Canada, Olsson *et al.* (2004: 86) conclude: "Adaptive co-management is about creating platforms or arenas, involving user groups and interest groups for knowledge sharing and collaborative learning about ecosystem management." From this perspective, the diversity of knowledge and viewpoints enhances the learning process for ecosystem management by combining "multiple learning systems" (Kendrick, 2003). However, this process is complex and particularly challenging when stakeholders maintain dissimilar worldviews. Olsson *et al.* (2004: 86) refer to "sense-making" as a mechanism to combine several knowledge

systems, embedded in value systems and worldviews, in a particular social-ecological management context (see Weick, 1995; Westley *et al.*, 2002). In the context of adaptive co-management, sense-making implies taking different interpretations of the world seriously, inventing and reinventing a meaningful order, and then acting upon it. “For such a profoundly disorganized and multi-scale approach to thrive,” write Pritchard and Sanderson (2002: 168), diverse actors “must share a common vision.”

Bali’s ongoing experiment in adaptive governance brings together diverse stakeholders with what might appear to be different worldviews. The adaptive co-management framework for Bali’s Cultural Landscape that emerged in the fifth and final revision of the nomination co-convened farmers representing subak, bureaucrats from multiple sectors across administrative levels and jurisdictions, and members of civil society and private sector interest groups. Together, these diverse actors and actor groups formed a Governing Assembly for Bali’s cultural landscape site (see chapter 6). Tri hita karana provided an acceptable shared vision to reconcile differences among their respective operating environments, livelihood strategies, and goals. What made this concept so attractive to such diverse stakeholders?

B. Tri Hita Karana, Balinese Cosmivision, and Contemporary Discourse

Among contemporary Balinese intellectuals, tri hita karana is now widely credited as the guiding principle for indigenous natural resource management in Bali (Panji Tisna, 2001; Sutawan, 2004; Agung, 2005; Ashrama *et al.*, 2007; Hakim *et al.*, 2009; Pitana, 2010). It translates from the Sanskrit *tri* (three), *hita* (benefit, profit, good, welfare), and

karana (the act of making, producing, effecting) (Zoetmulder, 1982). The philosophical roots of the concept can be traced to the *Yajur Weda* and the *Bhagavad Gita* (Chapter III), which points to holy sacrifice as the basis for relations among nature, humankind, and the divine (Agung, 2005; Kusumba, 2000 in Arthawiguna, 2008; Dharma Putra, 2011). Tri hita karana encodes the belief that prosperity and good can best be achieved through a harmonious relationship between people and other humans (*pawongan*), nature (*palemahan*), and the divine (*parhyangan*). According to Balinese anthropologist I Gede Pitana (2010: 139), the concept constitutes part of the traditional “local wisdom” of the Balinese, “that life must be in accordance with the changing environment, and that happiness can only be achieved if ... life is in balance.” It is described by Anak Agung Gde Agung (2005: 290) as a “complex of universal values and practices to achieve prosperity” and to guide one’s path to balance and harmony through ritual and practice. In this way, it expresses an ethical code or value system that seeks balance among physical, spiritual, and social elements, one that can be traced to the Balinese conception of the world.

Tri Loka and the Sacred Balance of the Cosmic Order

An important component of the Balinese worldview is the Sanskritic division of the universe into three interconnected and hierarchical worlds, or *tri loka*. The underworld (*bhur*) inhabited by demons, the world of humans (*bhuwah*), and the world of the gods, spirits, and ancestors (*swah*) (Agung, 2005). These terms have come to mean the three

respective domains of plants and animals, people, and the divine (Lansing, 2006).²² The tripartite organization of cosmos is embodied in the concept of *tri angga*, meaning “three parts”, in which all aspects of the cosmos are organized into three components, namely *nista* (bottommost, most profane), *madya* (intermediate), and *utama* (uppermost or most sacred). *Tri mandala*, for example, refers to three domains of spatial order that guide the physical arrangement of a village or housing compound: animals are found in the lower zone (*nista mandala*), people and their homes occupy the middle zone (*madya mandala*), and religious buildings and temples occupy the sacred upper zone (*utama mandala*) (Pitana, 2010). Another example, *trisamaya*, refers to the divine trinity of Brahma, Wisnu, and Siwa. *Tri angga* is extended to the concept of *tri hita karana*, comprising the three elements of nature, humans, and the gods.

Within this tripartite worldview, one finds the Balinese doctrine of dualisms (*rwa bhineda*) in which the relationship of two opposites is defined as balanced and complementary. Rather than contradictory, two contrasting forces—such as the sacred and profane, male and female, hot and cold, or the material world (*skala*) and mystical world (*niskala*)—coexist as part of a unifying process in which a third position, or center, balances the seeming contradiction (Agung, 2005: 287-293; Lansing, 2006: 197; Pitana, 2010: 142).²³ To achieve “sacred balance” between contrasts, a Balinese performs

²² In the original Sanskrit, these terms refer to three ranked upper worlds: “the earth (*bhur*), sky (*bhuwah*), and the space beyond the sun (*swah*)” (Lansing, 2006: 205).

²³ According to Lansing (2002: 129), Balinese cosmological dualism is present in the inscriptions and art of the earliest Balinese kingdoms, predating Hinduism. Dualistic cosmology is common to Austronesian societies across the archipelago (Fox, 1989). This is represented in the macrocosmos, *bhuana agung*, and microcosmos, *bhuana alit*, and the corresponding natural and social orders. When Indian religions arrived in Bali, they did not contradict the division of the cosmos into paired contrasts, but enriched it with a third subjective component that reflects the inner experience of the mind. The first clear indication of

ongoing rituals and deeds (*yadnya*) in honor of the gods. In performing *yadnya*, there are certain principles to which one must adhere. One of the most important among them is *desa kala patra*, which dictates that every action must be adjusted to the appropriate place (*desa*), time (*kala*), and condition (*patra*). By following the principle of *desa kala patra*, people can maintain flexibility and adapt in order to avoid conflict and achieve harmony and balance. This principle is the essential foundation for the goal of *jagaddhita*. Of Sanskrit origin, the term translates as “the well-being of the world” (Zoetmulder, 1982). In recent writings on Balinese cosmology, *jagaddhita* has come to mean individual and communal prosperity, peace, and happiness (Panji Tisna, 2001; Agung, 2005; Pitana, 2010).

Tri Hita Karana in Contemporary Bali

Although the origins of the philosophy are ancient, the term itself was apparently first introduced in November 1966, at the Regional Conference of the Balinese Hindu Community (*Konferensi Daerah I Badan Perjuangan Umat Hindu Bali*) (Arthawiguna, 2008). The late I Gusti Ketut Kaler, considered a leading figure in Balinese culture and religion, is credited with exploring and introducing *tri hita karana* in Bali, a concept he articulated based on his experience working in traditional Balinese villages.²⁴ For I GK Kaler, *tri hita karana* consisted of three elements, defined in the context of the human

“Indianization” in Bali dates from about the ninth century, although there is archaeological evidence to suggest the adoption of Indic ideas as early as the first century (see Lansing, 1983).

²⁴ Referenced in an undated article from the *Bali Post*, titled “Budayawan Berotak Brillan, Konsisten, dan Idealis”, received from I G.A.K Sudaratmaja. According to I GK Kaler, as noted in the *Bali Post* piece, there are no specific references to the concept in the Old Javanese texts of Sanskrit origin. Similarly, I find no direct usage of *tri hita karana* in translations of the Balinese creation story and man’s place in the universe, in Hooykaas (1974).

realm of the cosmos (*bhuana alit*) with the Sanskrit terms *atma*, or the spirit or soul; *prana*, as energy or power (derived from the natural world),²⁵ and *sarira*, which refers to the body. If any of these elements is not present in harmony with the others, then one will not achieve jagaddhita. In the late 1970s, he began writing about tri hita karana in a series of articles published in the *Bali Post*, later issued in book form in 1982 (Prabaswara, 2002; Bali Post, 2003). At that time, large-scale tourism development, launched in the early 1970s, was beginning to escalate (see chapter 2.B). According to his son, I G.A.K Sudaratmaja, the former head of Bali's Agricultural Research and Technology Assessment Unit (BPTP), I Gusti Ketut Kaler's writings on tri hita karana were meant to broaden and contextualize the concept, which was already part of Balinese oral tradition. In his father's view, the interpretation of tri hita had been restricted to its physical manifestation (*e.g.*, the orientation of physical structures such as temples and houses). By adopting a narrowly defined focus on *palemahan*, the relationship between humans and the environment, most Balinese, from Kaler's perspective, missed the point.

Influenced by the writings of Kaler and others, today tri hita karana has been adopted in public discourse to reference the goal of achieving jagaddhita in an ever-changing world (Ashrama *et al.*, 2007). In popular usage, its meaning has been simplified to its three principal elements and the relationship between them (see, for example, Djojo, 2009). In this conception, humans are situated at the center and the cause of balance or imbalance. If one element of the triad—god, humans, nature—is privileged or becomes stronger than the other two, imbalance will occur.

²⁵ Or *prani*, meaning “breath”.

Over the past decade, tri hita karana has become widely used in Balinese discourse, particularly in the popular media and among government officials and intellectuals.²⁶ In describing the influence of tri hita karana in Bali today, a researcher in BPTP remarked that the concept guides development on the island, deeply inspired by Hinduism. Moreover, “It is implemented as a basic concept in all aspects of Balinese life.” This is a recurring sentiment in recent newspaper articles and publications on the environment and development. Doubtless the very simplicity of this phrase has encouraged its widespread adoption. In 2000, Bali Travel News and the Bali Post Media Group launched the *Tri Hita Karana (THK) Tourism Awards and Accreditations*. The criteria for the awards are based on the tri hita karana philosophy, “to create harmony and balance in realizing tri hita karana concretely” (Ashrama and Ingham, 2002: 9; Wiranatha, 2010). Various publications of the Bali Post and the Bali Travel News in the past decade define strategies for expanding and strengthening the discourse of tri hita karana in Bali, as well concrete programs to apply the concept in practice. *Bali is Bali Forever: Sustainable in the Framework of Tri Hita Karana* (Ashrama et al., 2007: 229), for example, urges the government and private sector to “realize societal life that is harmonious” and congruent with the values of the philosophy. In 2007, the Government of Bali Province announced its vision for development on the island, titled “Welfare of Bali Island Based on Tri Hita Karana Principles” (*Bali Dwipa Jaya Berlandaskan Tri Hita Karana*) (Ashrama et al., 2007: 225).

²⁶ In interviews on the subject of social-ecological change in Bali, various respondents—including a socio-linguist, archaeologist, cultural experts and Balinese writers on the subak, typically commented that “tri hita karana is only 20 years old” and has become more widespread since 2000.

How is it that tri hita karana has come to garner such a central position in Bali, particularly in discussions of development, tourism, and the environment? According to the high Balinese Hindu priest, Ida Pedanda Ketut Kencana Singarasa, “People tend to talk more [now] about tri hita karana because they are more confused with the situation of unbalanced nature.” This notion of humankind’s imbalanced relationship with nature emerged as a common theme in interviews on development and conservation in Bali. In a discussion with a faculty member in Agronomy at Udayana University about Bali’s Cultural Landscape initiative, the professor suggested that it would be positive for Bali, so long as the “local genius” or local knowledge and practices are not disrupted. The professor continued:

Maybe you have heard about tri hita karana? Now its implementation is not good, because the Balinese are only thinking about money. They used to think about the relationship with God, about holiness. But now, they are thinking only about money... [W]e would like to propose some regulations to deal with these problems. First, development in tourism must be stopped.

In recent years, the deterioration of the environment is increasingly perceived as a crisis, an imbalance in which humans have privileged socio-economic gain over the natural world. In this way, tri hita karana, grounded in traditional Balinese Hindu values, has been adopted as a universal trope for maintaining harmony and balance and thus countering the turmoil of uncontrolled tourism development.

C. Tri Hita Karana, Kebalian, and Adaptive Capacity

The emergence of tri hita karana reflects a broader, historical pattern of drawing on traditional values at critical moments to redefine or affirm Balinese identity—or “Balineseness” (*kebalian*). French anthropologist Michel Picard (1999) and Allen and Palermo (2005) suggest that that this process “of retreat into ritual” is a strategy invoked in response to what Picard describes as the “colonization, Indonesianization, and touristification” of Bali. For Picard (2011: 482), the Balinese have been engaged in “a deliberate movement of Hinduization” since the Dutch colonial period at the turn of the twentieth century. The process is characterized by the selective adoption and transformation of Indic terms and concepts to redefine Balinese religious and cultural identity. In the 1920s, for example, the Balinese appropriated the Sanskrit term *agama*, meaning “religion” in Indonesia, to formulate ideas of Balinese religion.²⁷ With Indonesian independence and incorporation of Bali into the Republic of Indonesia in 1945, Balinese religious leaders entered into a protracted debate to concretize and name a universal religion. In 1958, the Balinese religion was recognized by the Ministry of Religion as *Agama Hindu Bali*, eventually renamed the more inclusive *Agama Hindu* (Picard, 2011).²⁸ More recently, the term *ajeg* (firmly planted), or *ajeg Bali*, has become a prominent feature of Balinese discourse since the Kuta bombings of 2002. Though there is no consensus on the meaning of *ajeg*, it has emerged as a “catch-all” term referring alternatively to stable, eternal, or sustainable Bali, an idea captured in the slogan

²⁷ In Sanskrit, *agama* refers to “a traditional precept, doctrine, body of precepts, collection of such doctrines. In Old Javanese, it can designate a body of customary law, or religious or moral traditions. In Bali, the use of *agama* is dissociated from the sense of tradition and law (Picard, 2011: 484-85).

²⁸ The first references to Balinese *agama*, or religion, were as *Agama Bali* or *Agama Tirtha* (The Religion of Holy Water). The word “Hindu” only became known in Bali in the twentieth century (Picard, 2011).

“Bali standing strong.”²⁹ *Ajég* often alludes to the revivification of Balinese culture, religion, and traditional values (Allen and Palermo, 2005).

In a similar way, the Balinese have drawn on Balinese Hindu cultural and religious traditions to formulate the concept of *tri hita karana* as an all-encompassing motif for maintaining balance and harmony with the natural, social, and spiritual worlds. In Bali, ancient cultural and religious forms are reconstituted as new concepts that shape adaptations to changing conditions. Fox’s reflections on Gandhian Utopia offer broader insight into the processes ongoing in Bali. Culture, writes Fox (1989b: 27):

is “‘constantly in the making,’ as its constituted meanings at any one moment are lived out anew and afresh in the next. Making culture in that next moment includes the possibility of remaking the old cultural meanings so they continue, as well as unmaking them so they disappear and new ones intervene.

In Bali, part of “making culture” is the active reconciliation of several ancient religious traditions, including Saivasiddhanta and Samkhya Hinduism, Varjayana Buddhism, and Austronesian cosmology.³⁰ Schoenfelder (2003: 65) observes that the selective “adoption, modification, and localization” of the Indic worldview has been ongoing in Bali for centuries, beginning prior to the first written inscriptions of the ninth century and continuing today.³¹ The integration of extralocal ideas and the adaptation of long-held principles to novel concepts are central to the process of *kebalian*. The process is seen to strengthen the resilience of local traditions and institutions, while maintaining the

²⁹ Stevens and Schmidgall-Tellings (2004) define *ajég* and *ajék* (Javanese) as invariable, constant, steady, stable, or regular (in Allen and Palermo, 2005: 240).

³⁰ One expression of this syncretism is the reading of poetry in four languages: Sanskrit, Balinese, and Old and Middle Javanese (Ramseyer, 1986).

³¹ See Lansing (1983) on the process of “Indianization” in Bali.

essential features of Balinese society (Agung, 2005; Pitana, 2010). Concepts are continually remade and invoked, in part, to restore balance in an atmosphere of uncertainty about the future. In this way, tri hita karana has become a generalized conceptual platform for the emergence of new mechanisms for coping with the uncertain future of Bali's cultural landscape.

D. The Subak System as a Manifestation of Tri Hita Karana

The Three Elements: Subak, Rice Terraces, and Water Temples

Tri hita karana is now described by the Dean of Agriculture at Bali's leading university and many others as a philosophy that is both manifest in and guides the Balinese subak. By observing ritual cycles and practices related to rice farming and pest management; planting, harvesting, and carrying out the work of farming; and maintaining the terraced landscape and coordinated irrigation systems, the subak maintain a harmonious relationship with the natural world (Sutawan, 2004; Arthawiguna, 2008). Social relations are manifest in the *krama subak*—the members themselves—and the governance mechanisms they have developed to maintain harmonious relationships. These include, for example, rotational elected leadership; the customary rules of the *awig-awig*, which designate penalties for water theft, lack of participation in subak activities, and inappropriate etiquette in subak meetings; and the tendency for endogamous marriages within subak to help maintain social bonds over long periods of time (Lansing, 2006). In the realm of the divine, one finds an intricate cycle of subak rituals, daily offerings, and ceremonies; as well as the hierarchy of subak temples, from

the *sanggha catu* (the alter of an individual farmer situated near the irrigation inlet) to the *pura ulun suwi* (subak temple) to the supreme Pura Ulun Danu Batur, dedicated to the Goddess of the Lake on the rim of Lake Batur (Sutawan, 2004; Lansing, 2006).

For each of these aspects, the idealized concept of balance or harmony is contrasted with (or complemented by) its oppositional state observed by Balinese agricultural researchers. Harmonious relations with the environment are threatened by the excessive use of chemical inputs that has resulted in a decline in soil fertility and beneficial flora and fauna, water shortages, and a deterioration of water quality. The potential for conflict, corruption, or a shift in the balance of power from more democratic to authoritarian subak governance is ever-present.³² Studies by Lansing (2006: 115) and colleagues on subak governance suggested that,

even the strongest and most democratic subaks were in a state of precarious balance, in constant danger of sliding into authoritarian rule or else into a kind of chaos, where water theft becomes commonplace and the gods do not receive their due at the temples.

When imbalance occurs, subak rites and the often elaborate rituals and performances of the “water temple cult” are invoked.³³ From the perspective of subak scholar Nyoman Sutawan (2004), Bali has arrived at a moment of imbalance, where the future of the subak and the water terraces is threatened by severe and compounding threats. Restoring balance requires not only religious rituals and rites, but a “revitalization” of *tri hita*

³² See Lansing (2006) for a detailed analysis of conflict and cooperation within and among subak, esp. chapter 4, pp. 67-121.

³³ In addition to ceremonies and rituals, there are other mechanisms to resolve conflict, such as a mediation through the *Subak Gede* (Great Subak), comprising representatives from several related subak (Lansing, 2006) or through a local official (*sedehan*) within the jurisdiction of the relevant watershed (Sutawan, 2004)

karana by enacting the principle in daily life. According to Sutawan, subaks have indeed actively applied the principle of tri hita karana through the activities and social and symbolic elements of rice cultivation. What is needed now, he argues, are effective policies, programs, and enforcement to restrict the conversion of paddy fields and support the subak at a time of dramatic change.

A Subak Perspective

As noted above, tri hita karana now often appears as a topic of discussion among government officials and academics, and it is commonly referenced in the media. Among farmers, however, the conversation turned to the concept with far less frequency, perhaps reflecting their relatively limited exposure to the mass media.³⁴ Occasionally, a subak member would mention the principle defined in its most basic terms. In some cases, for example, farmers contextualized the organic ecofarming project Somya Pertiwi in Wangaya Betan in terms of its relationship to the elements of tri hita karana.³⁵ More often, the values of tri hita karana are *demonstrated* in daily practices, governance mechanisms, and subak ceremonies. Typically, when commenting on planting seasons or activities of rice cultivation, farmers integrate discussion of productive tasks with ritual and symbolic events. In one particularly detailed example, a farmer from subak Wongaya Gede described the two *taur* (planting) times during each year, together with

³⁴ This may be attributed to a lack of direct questioning on the subject of tri hita karana during my early fieldwork in Wangaya Betan and neighboring farming communities and subak in the Batukaru area. By contrast, Agung (2005: 290) conducted a survey on knowledge of tri hita karana and related concepts with 50 farmers in Jatiluwih. According to Agung, 92% of the respondents demonstrated “much” or “average” knowledge of tri hita karana and 93% (across a larger sample of 200 farmers from four communities in other areas) reported implementing the principle in their daily activities.

³⁵ This project is the subject of chapter 5.

the semi-annual *odalan* ceremony that takes place at the highest temple in the Catur Angga Batukaru mandala. The *odalan* is a semi-annual ceremony to celebrate the anniversary of a temple's dedication and honor the gods residing therein.

After sowing, the farmers *mesaba* (give offerings) at *Pura Penyaum* and 28 days later they give offerings at *Pura Jero Sasah*. Then, we go back to the subak... There is a ceremony when the first fruit starts to come out and before harvest time. When the paddy becomes yellow, there are offerings at [the lower temples] *Pura Petangat* and *Pura Pengubengan*. After that, the paddy is ready to harvest. This all happens in taur time.... There is also a ceremony called *Mapag Toyo*, which is held to make the water flow.... There is a *piodalan* ceremony held ... every 210 days [twice a year] according to the Balinese calendar, at Pura Batukaru. In this ceremony, farmers are given rice that is taken from the granary (*lumbung padi*) at Pura Luhur Batukaru... Then, the paddy they receive at the Pura will be used as seed in seeding time.

This example illustrates the seamless interconnectedness of maintaining the agricultural landscape, the associated temple rituals, and the subak—each contributing to attaining balance and order in an uncertain paddy-based livelihood system. It also highlights the connections among temples within the Batukaru watershed. Farmers in the area receive seed from Pura Luhur Batukaru, linking them physically and symbolically to the high temple and neighboring temples and temple congregations. These rituals, like the patterns of synchronized flooding of terraces and planting cycles across a watershed (chapter 2) illustrate *yadnya* at the landscape scale.

To better understand the enactment of *tri hita karana* at the subak level, we posed a short series of questions to the random sample of 156 farmers from subak in the Batukaru area (Table 6).

**Table 6. Changes in the social, spiritual, and environmental aspects of the subak
Over the past 30 years, what has changed in the condition of (N=156):**

		Improved		No change		Decline	
		n	%	n	%	n	%
Soc	Resolution of conflicts within the subak	45	29	106	68	5	3
Soc	Participation of subak members	56	36	98	63	2	1
Sp	Ceremonies and condition of the subak temple	57	36	93	60	6	4
N	Maintenance of rice terraces	12	8	116	74	28	18
N	General health of the rice paddies*	13	9	95	61	47	30

*Note: For this variable, N=155

Soc=social realm (pawongan); Sp=divine, spiritual, supernatural (parahyangan); N=natural environment (palemahan).

The questions ask farmers to consider changes they have observed over the past 30 years (or during a lifetime of rice farming) in social, spiritual, or environmental aspects of the subak. In response to the questions pertaining to social relations and governance mechanisms, ascertained in terms of conflict mediation and participation of members, the majority of farmers indicated that conditions have remained constant or improved. Similarly, almost all farmers indicated that the conduct of ceremonies and condition of the subak temples have remained the same or improved, reflecting strong relationships between subak members and the spiritual element of tri hita karana. In terms of relations with the natural or environmental realm, however, responses shifted toward imbalance. Maintenance and the overall condition of terraces have primarily remained the same (74%), declining, however, for 18 percent of respondents. Terrace maintenance is typically the responsibility of individual households, though occasionally undertaken as *ngayah*, or collective work. Responses about the overall health of the rice paddies

suggested deterioration over time, with 30 percent of farmers indicating a decline. These findings suggest that subak and their members continue to enact the values embedded in tri hita karana in daily ritual and practice, maintaining their temples, the landscape, and their social institutions. However, mitigating the decline in agroecological conditions—or, rather, restoring the imbalance between humans and the environment—may require the application of tri hita karana at a different level.

E. Tri Hita Karana and the Subak at the Center of the *Cultural Landscape of Bali Province*

Allen and Palermo (2005: 239) suggest that a consistent Balinese response to “colonization, Indonesianization and touristification” is the use of strategies to “defend the island” from “bad influences” that draw on traditional values to restore balance and order. One such strategy that has developed in Bali over the past decade is the establishment of a UNESCO World Heritage Cultural Landscape site. UNESCO does not have the authority to regulate tourism development and land conversion in Bali, nor to enforce existing laws that do. However, the establishment of World Heritage adds both leverage for local enforcement and incentive to protect and maintain the island’s unique cultural and ecological attributes, and the cosmology behind them (discussed in chapter 6). Prior to the inscription of the site on the World Heritage list, the Head of the Department of Culture in the Tabanan regency remarked:

We will be very, very glad that our young generation in 100 years, 200 years, will still see these beautiful rice terraces, yes, beautiful. And green forests, and lakes without environmental pollution...If this is not nominated, this landscape, the rice terraces will change into modern buildings, no beautiful panorama anymore, the nature will change, and no culture. ...Through the guidelines and the guidance of UNESCO, I think this will give inspiration, and maybe international pressure [to counter] bad things.

To galvanize broad support for conservation through the UNESCO project, the Balinese focused on *tri hita karana*. Although the principle began to appear as a framing concept in tourism management projects in the early 1990s, “it is not like what we’re dealing with in the World Heritage project.” According to a member of Bali’s Cultural Landscape planning committee—who participated in the earlier projects of the 1990s, the recent World Heritage initiative “is really based on *tri hita karana*. ... [It’s] the basic thing, the basic ideology, the basic philosophy is *tri hita karana* and how it is applied in the *subak* system.”³⁶

In 2002, the UNESCO World Heritage Centre sponsored a special mission to Bali to assist the Indonesian authorities in preparing the nomination dossier, a process first initiated in 2000 (see chapter 6). The mission team observed that “the most pervasive quality [of Bali] is the Hindu-Balinese cosmology and its tripartite systematization.” The primary recommendation of the team was to identify a “common denominator” for all sites proposed for World Heritage. The Balinese cosmology, which “is responsible for [the island’s] social structures and cultural identity, and has shaped its landscape and built

³⁶ In the 1990s, the Governments of Indonesia and Bali Province made three unsuccessful attempts to nominate the supreme temple complex of Besakih as a site of World Heritage. The concept of “heritage” (*warisan*) as an organizing framework failed to catalyze support for the initiative, as most Balinese feared they would lose control of “abandoned *warisan*”. See chapter 6 for a more detailed discussion.

heritage,” provided a common theme to bind together various sites chosen to represent Bali’s natural and cultural heritage (Bond *et al.*, 2002: 32-33). Subsequently, Bali’s World Heritage planning committee identified tri hita karana as a philosophy of “outstanding universal value” (a pivotal criterion for World Heritage sites) underlying the proposed sites. In 2004, the Government of Indonesia presented to UNESCO a revised dossier nominating the “Sites of Balinese Cosmology,” organized around tri hita karana.³⁷ The nominated sites included the village and rice paddies of Jatiluwih (in Batukaru), the Taman Ayun temple in Mengwi, and a series of archaeological sites along the Pakerisan river valley.

At the time the planning committee was developing the nomination for a cultural landscape nomination, tri hita karana was gaining widespread appeal in Bali. It offered a guiding framework for managing the island’s natural resources, based on the maintenance of harmonious relations between humans and the environment. Not only did tri hita karana provide the cosmological foundation for a “common denominator” underlying the selection of proposed World Heritage sites, but it was a theme that resonated with a diverse association of actors across multiple government departments and geographic regions, and with civil society (*masyarakat*).

In 2008, the Balinese planning committee reframed the focus of the World Heritage proposal. As described above, the shift followed from ICOMOS’ recommendations that the World Heritage nomination consider more directly the extent and scope of the subak

³⁷ The organization of the earlier World Heritage proposal is clearly illustrated in the “Skema Nominasi,” which identifies Tri Hita Karan as the representation of “Outstanding Universal Value” permeating “all aspects of Balinese society” (“*seluruh aspek kehidupan Masyarakat Bali*”), in Rencana Penulisan Kembali Dossier Nominasi Cultural Landscape of Bali Province, prepared by Daud Aris Tanudirjo (no date).

system in maintaining the rice terraces and its relationship with water temples and forest catchment areas (ICOMOS, 2008). While keeping (though expanding) the original cluster of sites nominated in 2004, the subsequent revised nominations centered on the subak and the water temple networks as a manifestation of tri hita karana, rather than the concept of tri hita karana itself.³⁸ Although the 2007 proposal recognized that Bali's "exceptional landscape would not have been created without the *subak* organization" (IMCT, 2007, Executive Summary) the focus of the "Statements of Outstanding Value" undergoes a subtle shift between 2007 and 2009. The following excerpts illustrate the change in focus.³⁹

Cultural Landscape nomination, 2007:

The Cultural Landscape of Bali Province is an outstanding manifestation of the unique Balinese cosmological doctrine. It is the tangible reflection of the original Balinese ideas and beliefs with their roots in the *Tri Hita Karana* concept, which is the awareness of the need to always maintain a harmonious relationship between God, Humans, and Nature in daily life.

Cultural Landscape nomination, 2009-2011:

The subaks and water temple networks of Bali reflect the Balinese philosophical principle *Tri Hita Karana* ("three causes of goodness"), which promotes an harmonious relationship between the individual and the realms of the spirit (*parhyangan*), the human world (*pawongan*) and nature (*palemahan*). This abstract idea is given concrete realization in the lives of the Balinese through the institutions of subaks (ancient, democratic self-governing farmer's associations) and water temples, which give spiritual meaning to the governance of the rice terrace ecology.

³⁸Chapter 6 deals with the World Heritage nomination process, beginning in 2002. This passage refers to nomination dossiers subsequent to 2007, including revised dossier presented to UNESCO in 2009, 2010, and 2011.

³⁹ These excerpts are found in the Executive Summaries of the respective nomination dossiers (IMCT 2007, 2009-11). Appendix D presents full Statements of Outstanding Universal Value from the 2007 and 2009/10/11 nomination dossiers as presented in the respective Executive Summaries.

The inscribed UNESCO World Heritage site (2012) is officially titled the *Cultural Landscape of Bali Province: the Subak System as a Manifestation of the Tri Hita Karana Philosophy*. This maintains the central theme of tri hita karana and unique attributes of Balinese cosmology as the organizing principle, while focusing on the social institution that maintains the landscape through temple rituals, offerings, and productive labor. For participants in the nominating process, the shift in focus did not detract from the unifying principle of tri hita karana. In a conversation about the World Heritage initiative, the Head of Bali's Department of Culture Dr. Nyoman Nikayana, observed, for example, "Farming activities and the organization of the subak reflect the implementation of tri hita karana, which represents the harmonious relation between man and God, man and man, man and the environment." By supporting the subak, the Balinese help to perpetuate harmonious relations between humans and the natural world, mediated between water temple rituals and offerings. The principle of tri hita karana, rooted in Balinese-Hindu philosophy, provided the "platform or arena" from which the World Heritage initiative was realized.

F. *Bali is Bali Forever*

By definition, adaptive co-management is an approach that brings together diverse actors and actor groups from multiple institutional levels, across autonomous regional areas (Folke *et al.*, 2002; Olsson *et al.*, 2004; Folke *et al.*, 2005; Armitage *et al.*, 2007). As the process of developing Bali's UNESCO World Heritage Cultural Landscape evolved, the institutions and regional jurisdictions participating in the initiative expanded,

including government agencies, subak, civil society, and the private sector.⁴⁰ From 2002 to the present, the philosophy of tri hita karana has been the “common denominator” linking together the nominated sites and the network of diverse stakeholders. Some observers contend that the extent to which tri hita karana has been oversimplified and used as a refrain for environmental stewardship renders it *pepesan kosong*, or empty rhetoric.⁴¹ Nonetheless, it has become a centerpiece of collective efforts to mitigate rapid environmental degradation in Bali. The invocation of tri hita karana as an organizing theme for the World Heritage initiative suggests the importance of cosmology and common values to garner widespread support for conservation. In Bali, the use of tri hita karana as a unifying framework for conservation extends beyond the immediate stakeholders and participants to the general public. In the epilogue of *Bali is Bali Forever*, Ashrama *et al.* write (2007: 221):

As has been suggested by the Project of Bali Cultural Heritage Conservation..., the conservation of Balinese culture should be interpreted in [a] broader sense that also embraces the component[s] of adaptation, reconstruction, revitalization, reinterpretation and utilization.

Only in this way, the epilogue continues, does the Balinese community move toward *Bali jagaddhita*. “It is in this matter the tri hita karana should become guidance... in the process of change ... heading for the more prosperous future.”

⁴⁰ This process is discussed in more detail in chapter 6.

⁴¹ See Allen and Palermo (2005: 252) for an analysis of ajeg as *pepesan kosong*.

CHAPTER 5 GOING ORGANIC IN WANGAYA BETAN

In 2005, four farmers from subak Wangaya Betan in Batukaru joined researchers from Bali's agricultural research and technology assessment unit (BPTP) to promote organic farming of native Balinese rice varieties. By the July 2006 planting season, there were 30 farm families preparing their rice terraces with organic compost.⁴² In exchange for technical support and inputs, the farmers volunteered to experiment with the new organic technologies developed by the initial group of farmers and BPTP. Given their reliance on the semi-annual harvest to feed their families and provide supplemental income, a significant level of risk is attached to the on-farm trials.

The project began as a localized effort to address the specific problems of yield stagnation and the accumulation of livestock waste in the area. Today, all farmers in subak Wangaya Betan grow organic rice, as do a number of farmers from neighboring subak in Batukaru. The group has established a nongovernmental organization *Kelompok Somya Pertiwi* (Gifts from the Earth Goddess Group) and a field training center. Farmers and agricultural extension agents from Bali and throughout Indonesia come to Wangaya Betan to acquire traditional rice varieties and learn how to produce compost and begin organic rice farming on their own fields.

From various perspectives, the project is considered a success. Farmers who are members of Somya Pertiwi have observed noticeable benefits in terms of yield and soil quality. Similarly, researchers who have studied the project describe it as an exceptional

⁴² I first visited the project in Wangaya Betan in July and August of 2006.

achievement and an example of resilient rice farming in Bali (Lorenzen, 2011; MacRae, 2011). Based on the success of Somya Pertiwi to date and its potential for addressing some of the socioeconomic and environmental problems facing Bali's rice farmers today, the project has become a centerpiece of the UNESCO Cultural Landscape model. The experience of Somya Pertiwi is the subject of this chapter. In sections 1 and 2, I describe the organic farming initiative that began in Wangaya Betan in the context of national policy shifts to encourage organic agriculture throughout Indonesia. Section 3 discusses the project as an example of local-level adaptive governance. Section 4 considers the potential of the project as a model for the broader World Heritage initiative.

A. Organic Farming in Wangaya Betan: "Gifts of the Earth Goddess"

The topography of subak Wangaya Betan, home to the project Somya Pertiwi, is rugged, featuring hillside rice terraces framed by the grandeur of Mount Batukaru rising over the landscape. Located a few hours' drive from Denpasar, the somewhat remote site is accessed on a narrow, winding road. The inhabitants of the area are farmers, as were their parents and grandparents. Today, 92 percent of the farmers surveyed throughout Batukaru cultivate paddy rice as their primary livelihood activity. On average, they harvest four to five tons of rice per hectare, on paddy landholdings of that average one-half hectare—typical throughout Bali both in terms of yield and average landholding size. Another four percent of farmers surveyed in Batukaru work in the agricultural sector as livestock holders or in rice milling, for example.

The administrative district of Penebel, in which Wangaya Betan is located, is also one of the major livestock production areas in the Tabanan regency. Poultry houses, in particular, dot the roadway extending north from Wangaya Betan to the top of the rice terraces. The BPTP research scientist Dr. Alit Arthawiguna often remarked in jest that there are more chickens in the area than people. This is no understatement. While the population of Penebel in 2007 was nearly 50,000 (among over 410,000 people in all of Tabanan regency), the department of statistics reported over 1.65 million poultry that same year (BPS Tabanan, 2008). According to Arthawiguna, there has been considerable growth in commercial poultry production in the area in recent years, resulting in an excess of agricultural waste. Penebel also has the second highest cattle holdings in the regency, with 10,200 head of cattle in 2007 (about 16% of the cattle in Tabanan).

For Arthawiguna and the farmers of Wangaya Betan, livestock are the source of “*emas hitam*,” or “black gold,” which can be used together with poultry waste and other inputs to produce high quality compost for organic rice production. The primary aim of Somya Pertiwi is to increase rice yields and farmer incomes, through organic cultivation of local rice varieties (*padi Bali*). While it is common practice in the area, for those farmers who have access to livestock, to spread manure on rice fields, the methods of Somya Pertiwi are far more systematic and technical in nature. Through successive on-farm trials Somya Pertiwi has developed a specific compost “recipe” (*resep*). Farmers combine crop residues from rice, coffee, and cacao with chicken and cattle manure,

augmented with the probiotic input StarbiO to produce high quality compost used as a substitute for chemical fertilizer.⁴³

A central focus of Somya Pertiwi has been to connect organic farmers with producers of “black gold,” as a way to simultaneously deal with livestock waste in the area and boost farm yields. For many farmers, the lack of cattle is a real constraint to on-farm production of compost. Nearly one-quarter of the farmers surveyed in Batukaru do not own cattle, while another two-thirds reported owning one to four animals.⁴⁴ To address this problem, Somya Pertiwi has facilitated the acquisition of cattle among its members, through a government breeding program or local arrangements in which a farmer who cares for a cow receives its calf.

Although Somya Pertiwi began in a subset of the subak, it appeared to be spreading through the Batukaru area, subak-by-subak. As noted above, the project expanded within three years to include all 90 members of subak Wangaya Betan, as well as some farmers from neighboring subak Peseletan, Umadui, and Gunung Sari.⁴⁵ Survey data showed that by 2008, almost half of the farmers sampled throughout Batukaru had used organic fertilizer with good results (Table 7). Half of the farmers in this category came from the four subak where BPTP and Somya Pertiwi have focused their efforts to transition to organic agriculture. This represents 70 percent of farmers surveyed from these subak.

⁴³ When livestock consume StarbiO, they produce manure that more easily breaks down crop residues and other compostable waste products (<http://www.lembahhijau.com/>).

⁴⁴ A few farmers (2%) own eight to twelve cattle.

⁴⁵ Subak Umadui and Gunung Sari are tempek (sub-subak) of the large subak Jatiluwih Gede.

Table 7. Farmer's use of organic fertilizer on irrigated rice fields in Batukaru

	n	Percent
Already used, with good results	76	49
Already used, with poor results	5	3
Not yet used, but interested	51	33
Not used, not interested	24	15
<i>Total(N)</i>	<i>156</i>	<i>100</i>

Of the farmers who had not yet used organic fertilizer, but would like to use it in the future, 84 percent came from four subak: Bedugul, Soka Candi, Piling, and Uma Kayu. The 24 farmers who indicated no interest in organic farming were concentrated in subak Piling and Bedugul, accounting for 18 of the 24 respondents in this category. The use of organic fertilizer is perceived by many farmers to be too labor intensive, compared with urea-based fertilizer. A lack of knowledge about organic agriculture (*sistem organik*) is another primary constraint to its adoption in the area. In Batukaru, the use of organic fertilizer appeared to correlate with subak affiliation rather than other characteristics such as village (*desa*) or age cohort.

There are two issues to clarify with regard to the use of organic fertilizer among sample farmers, and in Bali more generally. First, it is likely that actual use of organic farming practices is under-reported in the data. As described above, the majority of farmers in the Batukaru area use some sort of organic amendment (*e.g.*, raw manure, crop residues) as part of their farming methods. BPTP has focused on the production of high quality compost to ensure that yields are as high as or higher than rice cultivated with

chemical fertilizers. Although there has also been considerable attention to promoting compost production on-site at farmers' fields, there is a common perception among farmers that "organik" refers specifically to the use of compost obtained through reputable suppliers or prepared with additives such as StarbiO.

The second key issue relates more to local conceptions of what it means to be an organic farmer. In Bali, and Indonesia more generally, there are two predominant approaches to organic farming. The first is "absolute organic farming" (*pertanian organik absolut*, POA), a system which prohibits the use of any inorganic inputs. The second approach is referred to as "semi-organic (or rational) farming" (or *pertanian organik rasional*, POR), in which chemical inputs supplement non-chemical fertilizers, pesticides, and herbicides. The latter approach recognizes the potential for yield declines with the transition to organic farming, a risk to individual farmers and national food security (*ketahanan pangan*). The POR approach advocates the use of site-specific nutrient management that combines chemical and organic inputs to maintain or enhance yield, while decreasing the use of chemical fertilizers (Isral Las and Setiyanto, 2006). In Batukaru, 20 percent of the farmers who used organic fertilizer with good results also reported use of urea-based fertilizers that exceeded the current recommendation of 250 kg per hectare.

Semi-organic farming does not alleviate the negative environmental consequences of chemical inputs. It also presents challenges for certification and marketing of organic products. However, the approach has two primary benefits from the perspective of BPTP research scientists. First, as Arthawiguna and other initiators of Somya Pertiwi attested

any application of organic fertilizer translates into reductions in chemical fertilizer use and associated environmental impacts. Second, the project was built around the mantra “*sedikit-sedikit*”, or little-by-little. By starting small, gradually expanding, and carefully monitoring results, BPTP and Somya Pertiwi seek to demonstrate success that will be attractive to other farmers. The project’s initiators began with a semi-organic strategy *and* the intention to transition to full organic certification over time.

To reduce the use of chemical fertilizer inputs, BPTP agents promoted “site-specific farm management” to counteract the blanket recommendations of the “technology packages” of the Green Revolution. Site-specific management has gained traction throughout Indonesia over the last decade. The approach centers on dynamic, “real-time” farm management techniques and the dissemination of monitoring and tools for use by farmers (Abdulrachman *et al.*, 2004). In Wangaya Betan, farmers used leaf color charts in place of chlorophyll meters, to help monitor nitrogen uptake. Another example was the application of simple color-coded pH test kits used on-farm, in lieu of collecting soil samples for analysis in a laboratory hours away in Denpasar. To facilitate use of these tools by farmers, BPTP posted extension agents on-site at Somya Pertiwi. The agents worked with farmers to take systematic readings on all participant fields participating for ongoing nutrient monitoring.

Since the project began, it has realized both socio-economic and environmental achievements. Rice yields among participating farmers increased as much as 10 percent. Activities related to production and sale of organic compost created new jobs in the area.

In terms of environmental changes, soil fertility has increased, with the percentage of soil organic matter nearly tripling from less than one percent to nearly three percent in three years (Arthawiguna and Inggriati, 2009). Farmers described an increase of biodiversity in the rice fields, evidenced by growing populations of mollusks, eels, worms and beneficial insects. As well, analyses of rice samples from Somya Pertiwi fields detected no pesticide residues of any kind (Sucofindo, September 15, 2008).⁴⁶

In 2006, Somya Pertiwi secured a grant from the Ministry of Agriculture to develop a training site known as P4S, *Pusat Pelatihan Pertanian Pedesaan Swadaya*. P4S features a center for meetings and workshops, cattle stalls, poultry house, compost and bio-urine production facility, rice mill, library, and computerized office space. It has become a center for participating farmers and visitors from the Batukaru area and beyond. Somya Pertiwi hosts researchers and interested visitors from Bali, Indonesia, as well as international guests who come to tour the site, or attend workshops and training sessions. The domestic and international attention the project has brought to Wangaya Betan has opened up opportunities for community-based agricultural tourism (*agrowisata*) and homestays in the village and surrounding area. Members of Somya Pertiwi tended to perceive the interest and acclaim of outsiders as indicative of their collective accomplishment.

⁴⁶ Farmers from subak Wangaya Betan report no pesticide use. Overall, half of the farmers surveyed report no use of chemical pesticides, and another one-third apply limited pesticides as needed.

B. “Go Organic”— Trends in Agricultural Policy and Practices in Bali, Indonesia, and the Asia Region

The initiation of Somya Pertiwi in Wangaya Betan mirrored a larger shift toward organic farming in Indonesia, and in Asia more generally. In a section titled “Food, Farming and the Environment,” the 2005/2006 report on the *State of Environment in Asia* highlighted new trends in the region’s agricultural production including the development environmentally sound farming practices, such as organic production and integrated pest management (Daizo and Kazuyuki, 2005: 86). Similarly, the Asian Development Bank articulated its vision in *Asian Agriculture Towards 2010* (Kaosa-ard and Rerkasem, 2000: 199): the Bank supported production increases through “high-input, high-output intensive farming” and “ecological farming.” A central component of the Bank’s strategy was strengthening national government policies and institutions for environmental conservation and natural resource management.

In January 2006, the Government of Indonesia launched an ambitious policy to “*Go Organic 2010*” across the archipelago (Isral Las and Setiyanto, 2006: 12). The policy emphasized the dual objectives of national food security and environmental amelioration. Go Organic was conceived as a means to mitigate and, to the extent possible, reverse the negative impacts of industrial agriculture on the environment and overcome the problem of yield stagnation. A paper outlining the components of the policy states (Isral Las and Setiyanto, 2006: 2):

Environmental issues in the agricultural sector have been a topic of discussion since the Green Revolution was introduced to increase rice production in the 1960s... Overuse of fertilizers, especially nitrogen fertilizers, pesticides, and [industrial waste] have been identified as the major factors deteriorating the condition of irrigated rice areas.

According to the policy paper, the Government of Indonesia is addressing the deterioration of agricultural land by introducing regulations on fertilizer and pesticide use, and promoting organic farming and research and development. Despite the policy initiative, the production of organic fertilizer in Indonesia has continued to be marginal compared with chemical fertilizer. The global economic crisis of 2007 and 2008, however, appears have to spurred investment in organic farming. By early 2009, one of Indonesia's five state-owned fertilizer companies, PT Pupukl Sriwijaya, had established partnerships with private investors to build four organic fertilizer plants. The other four companies were reportedly seeking similar investment partnerships (Besalicto Tnb., 2009).

Since the initiation of Go Organic, the Bali administration has incrementally increased financial resources to support organic farming. In early 2009, the provincial government shifted US \$100,000 out of general livestock assistance to provide training in compost production (Kencana, 2010). Later that year, the governor of Bali allocated more than US \$800,000 dollars (Rp 8 billion) to 10 organic farmers' collectives (Erviani, 2009d). The program encourages the shift to organic farming standards and the integration of crop and livestock agriculture.⁴⁷ In 2010, the Bali Agriculture Office

⁴⁷ The Government of Indonesia established national standards for organic farming in 2002 (see BSN, 2002).

announced that it would provide US \$ 1.1 million (Rp 10.3 billion) to scale up support to 100 farmers' cooperatives, increasing to 350 cooperatives by 2013. In addition to providing direct funding to farmers, the provincial government is phasing out the annual chemical fertilizer subsidy. In 2012, the full US \$425,000 (Rp 4 billion) subsidy will be directed to organic fertilizer. The Bali provincial government has planned to increase funding resources annually, to ensure that 70 percent of the island's production is organic by 2013.

The government's current support for organic farming in Bali vastly broadens the scope of organic initiatives in Bali. Over the past decade, a small sub-sector of agriculturalists, educators, environmentalists, and business owners have been promoting organic farming on the island. Their efforts have focused largely on upland coffee and vegetable production, characterized by integrated farming systems that include, to a limited extent, rain-fed rice. More recently, a range of small-scale initiatives in organic paddy has gained momentum (MacRae, 2005). The various actors—some Balinese, some foreign expatriates—are motivated by a diversity of interests. Some, like Ni Luh Kartini, recount stories from their youths, such as the disappearance of wildlife with the onset of intensive pesticide and fertilizer use in the early 1970s. A lecturer in agriculture at Bali's Udayana University, Kartini is a well-known advocate of organic farming and founder of the Bali Organic Association (BOA). Other organic farmers began with the desire to provide "green" foods for their families, expanding to establish restaurants and cafes that cater primarily to tourists. Others focused first on the financial benefits of high-value organic foods marketed to expatriates, hotel guests, and a growing Balinese

middle class. Integral to these diverse wellsprings of organic activity is a discourse of environmental awareness, health, and community (Greenspeak, 2001, 2005; Tokoh, 2008). While members of Somya Pertiwi also valued the health and environmental benefits of organic farming, they emphasized the relationship between healthy soil and yield and the quality of rice (*e.g.*, taste, smell, texture). They also sought to capture higher market prices ascribed to organic landraces (*e.g.*, Bali red rice) common to the Batukaru area.⁴⁸ For the farmers of Wangaya Betan and elsewhere in Batukaru, organic paddy is a pathway to enhance the viability of agricultural livelihoods, for themselves and future generations.

The 70 percent target for Bali and the national Go Organic initiative is particularly ambitious given the past 40 years of Green Revolution agriculture. Nonetheless, Bali is poised to lead Indonesia in the transition to organic rice cultivation –“sedikit-sedikit”. National and regional policy platforms depict organic farming as the future of the agricultural sector. Central and provincial government budgets have begun to reflect this policy change, scaling up support for ongoing and emerging organic farming enterprises in Bali. Somya Pertiwi and the P4S training center in Wangaya Betan are situated at the center of this movement as a model for implementing Go Organic.

⁴⁸ The selling price for one kilo of organic rice ranges between Rp 6,000 and Rp 15,000 (the latter for red rice), the equivalent of about US \$0.65 to \$1.60. In contrast, non-organic white rice sells for Rp 4,900 to Rp 7,000 per kilo (US \$0.50 to \$0.75). Price figures are derived from qualitative data, Besalicto Tnb. (2009), and Tokoh (2008).

C. Adaptive Governance at the Local Level

Somya Pertiwi emerged as a local-level response to a complex set of social and environmental problems. From the perspective of farmers in Wangaya Betan and those from nearby subak who have heard of their achievement, Somya Pertiwi was highly regarded. Similarly, government officials (outside of BPTP) and foreign researchers considered the project a success. The anthropologist Graeme MacRae (2011: 80), who has researched organic farming in Bali over the past decade, remarks: “the significance of what has been achieved in Wangaya Betan at this stage is difficult to overstate.” In many ways, the project in Wangaya Betan is an ongoing experiment in local level adaptive governance. As discussed in chapter 2, adaptive governance regimes tend to self-organize as social networks of actors that draw on diverse experiences and knowledge domains across multiple levels (Folke *et al.*, 2005). In robust social-ecological systems, higher level incentives and rules often facilitate the process of self-organization (Olsson *et al.*, 2004). An exemplar of adaptive governance, Somya Pertiwi has steadily engineered a range of options at the community and farm level to buffer disturbance, create novelty, and enhance resilience.

While there are multiple factors at play, we can identify three essential components that contributed to adaptive governance in Wangaya Betan: the social network and the role of leadership and trust; a collaborative learning approach that balanced livelihood and environmental priorities; and the strategic location of the project near the top of Bali’s rice bowl.

The social network in which Somya Pertiwi emerged is a critical element in fostering conditions for transformative change at the local level. Folke *et al.* (2005) argue that adaptive co-management requires social networks, in which loosely connected external actors and resources interact with internal ones to focus on common problems. These self-organized, multi-level networks build trust and social capital, stimulate collaboration and exchange, and foster novelty and innovation. Initially, Somya Pertiwi grew out of a relationship between two key individuals, Pak Arisa Nengah and Alit Arthawiguna.⁴⁹ Pak Arisa is a well-respected entrepreneurial farmer in Wangaya Betan who is committed to enhancing his community and, in a sense, modernizing farm livelihoods in the area. Arthawiguna is a Balinese agricultural research scientist with broad training in ecology and participatory community development, acquired both in Indonesia and the United States. Prior to forging a partnership with Wangaya Betan farmers, Arthawiguna worked with Steve Lansing and colleagues to conduct extensive tests on soil and water quality in Tabanan (Lansing *et al.*, 2001; Arthawiguna, 2002). This experience led him to conclude that there was an urgent need to curtail the use of chemical inputs in Balinese rice farming. At the same time, Arthawiguna was attentive to the increasing problem of animal waste polluting Bali's limited water supply. Arthawiguna's collaboration in Wangaya Betan began when Pak Arisa and the initial group of farmers approached him for help in dealing with the problem of agricultural waste. Nengah hosted a series of informal meetings during which Arthawiguna discussed the potential for organic farming. Although the meetings were held outside the subak, they were open to all subak members

⁴⁹ The stories of Arisa and Arthawiguna are available in the public domain, leading me to identify them by name. See MacRae (2011) and MacRae and Arthawiguna (2011).

and conformed to principles inherent to the subak: democratic, consensus-based, collaborative, and flexible. In this way, Somya Pertiwi emerged as an institution outside of, yet connected to, the traditional subak institution. Over time, the project grew to include all members of subak Wangaya Betan and has influenced adaptation at the subak level. This included discussion of changing the rules of the subak, codified in the awig-awig, to identify Wangaya Betan farmers as organic cultivators. Through Arthawiguna and BPTP, Somya Pertiwi is also connected to the state. Like the subak, however, it is not constrained by bureaucratic government hierarchies.

Leadership and the ability to build trust and social capital are critical to the social fabric of the project. The resilience literature identifies these characteristics as key features of adaptive governance. Pak Arisa and Arthawiguna are both dynamic leaders who have developed relationships of trust with each other and with participating farmers. Arisa had access to information and resources internal to the community, while Arthawiguna brought technical information, diverse and relevant experience, and access to external resources and exchange networks. Arthawiguna was intensely involved in the project. Over the years, he has invested an immense amount of personal time and energy in the community, distinguishing him as an exceptional representative of the government agricultural service. The consistent presence of BPTP over several years has been instrumental to building rapport, trust, and a spirit of partnership between farmers and the agricultural research office.

This investment translates to social capital, “the glue for adaptive capacity and collaboration” (Folke *et al.*, 2005: 451). Social capital is an asset that builds linkages

among key people in social networks and allows them to act collectively to achieve common goals (Krishna, 2002). Through Arisa and Arthawiguna, the network of individuals and agencies connected to Somya Pertiwi has steadily grown since 2005. The network is centered in the Batukaru area, but now extends throughout Bali, Indonesia, and internationally. Both leaders have galvanized local networks for mutually beneficial exchange, by connecting poultry and livestock farmers in Batukaru to paddy farmers, for example. Arthawiguna has also facilitated connections to external, “higher-level” incentives. Notably, the project began on the cusp of the favorable Go Organic policy. This has created opportunities for Arthawiguna to help the project attract resources, such as grants from the Ministry of Agriculture, as well as attention from national agricultural officials as one of Indonesia’s leading agro-eco villages. Farmers from Bali and throughout Indonesia come to P4S center for training in organic farming. In adaptive governance terms, the connections between internal and external resources and actors create forums and social spaces for deliberation, innovation, and ultimately change in ecosystem governance.

A second element of Somya Pertiwi that promoted adaptive governance was social learning. Experimentation and institutional learning are critical to ecosystem management and adaptation (Folke *et al.*, 2005). Significantly, the project engendered a sense of collaborative learning that is attentive to both farmer livelihoods and environmental conservation. Thus far, Somya Pertiwi has successfully navigated the tension between experimentation, critical for innovation and adaptation, and risk-

aversion, a trait common to agricultural households.⁵⁰ In his approach to organic farming, Arthawiguna consistently stressed the importance of yield. He was adamant that if organic farming is to be successful in Bali, it must first achieve yields that are commensurate with current conventional practice. Although he championed environmental benefits of organic farming, Arthawiguna recognized that farmers will not adopt organic farming if it does not provide secure household livelihoods. For this reason, BPTP has concentrated on producing and applying the highest quality compost. Moreover, the project is small in scale. It began with a group of four farmers and increased participation incrementally, to allow for data collection and modification. The experiment was carefully monitored and informed by the latest recommendations for organic paddy cultivation, a topic Arthawiguna follows closely. Members of Somya Pertiwi met regularly at the training center, both informally and during scheduled meetings, to exchange new external information and compare experiences on-farm. As a result of this ongoing process of collaborative learning, farmers in Wangaya Betan attained yields as high as eight tons per hectare using organic fertilizer, considerably higher than the average harvest of four to five tons per hectare using chemical fertilizers. Arthawiguna and BPTP shared these results with other farmers in Batukaru and elsewhere in Bali. For Arthawiguna, every farmer who chooses to use organic fertilizer represents a corresponding decline in chemical inputs.

Lastly, the success of the project can be attributed in part to how it has capitalized on geography. The project is located in the highlands, near the source of the water that feeds

⁵⁰ Most household decision-makers in Asia exhibit moderate to intermediate risk aversion, compared with African households that are severely or extremely risk averse (Yusef and Bluffstone, 2007).

the network of downstream irrigation canals. Moreover, pre-Green Revolution farming practices are more intact in the Batukaru area than in fields at lower elevations (see chapter 3). At the time farmers from Wangaya Betan approached Arthawiguna, he was considering potential sites to initiate organic farming research *in situ*. He readily admits that the strategic location of Somya Pertiwi contributes to its success. Bali's irrigated rice farming systems rely on centuries-old networks of irrigation canals. Unless all farmers within a given water system (*i.e.*, within a subak) transition to organic methods, those who farm organically would be unable to achieve certification under global regulations due to fertilizer runoff from neighboring fields. While rice produced by Somya Pertiwi farmers is not yet certified organic, the project was working toward this goal. From Arthawiguna's perspective, achieving demonstrable success with organic paddy on-farm, albeit under the best possible ecological circumstances, adds legitimacy to the organic project. The idea is to start at the top of the rice bowl, near the source of the springs and streams feeding the irrigation system, and work downstream to gradually ameliorate the problem of water pollution. Wangaya Betan provided an on-farm laboratory for experimentation, a place to refine both the technical agro-ecological and social components of organic farming. Arthawiguna and BPTP were working to take the experience of Somya Pertiwi and adapt it to other, perhaps more challenging, settings in Bali.

Coping with Disturbance

Part of Somya Pertiwi's success lied in its ability to cope with a variety of challenges. Farmers continue to seek solutions to problems, to monitor outcomes, and make small-scale adjustments. One of the primary goals, and main challenges, of Somya Pertiwi was to increase farmer incomes. Part of the strategy was to lower production costs by replacing chemical fertilizers with organic compost, while maintaining yield. As well, the project sought to enhance the capacity of farmers to process and market their harvest. Producing higher-priced organic rice results in marginal increases in income. To this end, Somya Pertiwi embarked on a bold initiative to manage rice processing and commercialization. In 2008, local farmers and Arthawiguna entered into a partnership with a new company, PT Management Subak Bali, which provided investment capital, and management and marketing expertise.⁵¹ The company began with the stated objectives of supporting local farmers by initially buying rice at fair, openly negotiated prices. Over time, the plan was to train local people to take over operations of the company and transfer majority ownership to local farmers. Company directors laid out a "socially responsible" business plan that included provisions such as health insurance, a completely new benefit for rural farmers.

To process and package the harvest, the company built a large, modern rice mill in Wangaya Betan, powered by a diesel generator. The scale of the mill, aptly referred to as a factory, far exceeded any other processing mill in the area. Farmers in the area were

⁵¹ Macrae (2011) chronicles the events surrounding the emergence and subsequent dismantling of PT Management Subak Bali. In this section, I draw on MacRae's paper, as well as my own encounters in Wangaya Betan in 2008 and 2009.

not able to produce enough rice to cover operational costs, much less keep the mill working at capacity. The company began purchasing rice from farmers in other parts of Bali, taxing the undeveloped road network. The focus of the majority of the company's directors began to shift toward financial imperatives. Increasingly, local farmers' skepticism of PT Management Subak Bali and the factory grew. Arthawiguna, one of the directors, together with a group of four other Javanese and Balinese businessmen and finance experts, continued to advocate for farmer interests, which included control over their harvest for household consumption and rituals. The mounting tension between farmers and the directors threatened to undermine the social capital Arthawiguna had established with the community.

In 2008, Arthawiguna resigned from PT Management Subak Bali and returned his focus to the production, research, and training components that spawned Somya Pertiwi. The activities of rice processing and packaging continued at Arisa's renovated, though comparatively modest, mill, the scale of which was better suited to local harvests than the factory. To advance the marketing aspect of their operation, Somya Pertiwi began working with small-scale government sponsored programs. Several months following Arthawiguna's resignation, the company moved out of Wangaya Betan and abandoned the factory.

In comparison with Somya Pertiwi, PT Management Subak Bali was mal-adaptive. The company began as an extension of the original project, intended to enhance the capacity of local farmers to capture revenue from the processing and marketing of their rice harvest. Somya Pertiwi grew incrementally and the project's social network

revolved around local and external actors, and relationships based on trust and collaboration. By contrast, PT Management Subak Bali was dominated by external actors who sought to expand quickly, at a rate that did not fit local social or ecological conditions. Although the long-term goal was to transfer ownership to local farmers, in the immediate-term farmers perceived a loss of control over their harvest. As it became increasingly apparent that the company was ill-suited to the local context the members of Somya Pertiwi dissociated from the company. The experience of the partnership with PT Management Subak Bali can be viewed as part of the ongoing experiment in Wangaya Betan. Somya Pertiwi regrouped and refocused efforts on making gradual improvements to farm livelihoods and the agro-ecology of the area.

D. From Wangaya Betan to World Heritage

By 2008, the success of Somya Pertiwi was well-known to the committee charged with revising Bali's World Heritage proposal. At that time, the BPTP research scientist Arthawiguna and others working in Wangaya Betan, myself included, were invited to contribute to the process of developing the dossier and management plan for the World Heritage nomination, which employs adaptive governance as an organizing framework. The committee recognized Somya Pertiwi as a potential model to address some of the social and environmental problems facing the subak throughout Bali. It was envisioned that the Cultural Landscape initiative would complement other activities in Bali to facilitate the transition to organic farming in each of the four World Heritage sites, including the Pakerisan river valley, Mengwi, and throughout Batukaru. With this in

mind, it is worthwhile to consider the lessons learned from the process in Wangaya Betan, and the potential for adapting the Somya Pertiwi project to subak in other areas.

Transformation at the Subak Level

As interest in organic farming percolates throughout Bali, it is increasingly manifest at the level of the subak. Although Somya Pertiwi began as a sub-set of the subak, it grew to encompass the whole subak and was expanding the purview of the subak beyond water management, even at the level of awig-awig. As part of my research, I often accompanied Arthawiguna to various field sites throughout Bali. Typically, travel to a given destination involved one to several detours to meet with a subak that wanted information and assistance with “sistem organik.” As MacRae and Arthawiguna (2011: 19) observe, the subak is poised to become an “agent” or “active partner” in the current transformation underway in Bali. The ability of the subak to adapt to emerging challenges, as Jha and Schoenfelder (2011) argue, has led to its resilience through time (see chapter 2.B). Through collective, consensus-based decision-making, the subak is adopting organic practices that have, and it is anticipated, will continue to enhance the resilience of paddy farming. The World Heritage Cultural Landscape initiative, in turn, centered on the supporting the subak in this process of social and ecological change.

Site-Specificity

As discussed in chapter 4, the problems of soil infertility, land conversion, and water shortages that challenge rice farmers in Bali today are island-wide. In Wangaya Betan, the institutional mechanism that emerged in response organized around the locally-perceived problems of excessive agricultural waste and declining yield and farmer incomes. Recent case studies on the subak emphasize the complexity and diversity of the subak as a group (see Chapter 2.C). Even within the Batukaru area, which appeared to be a relatively homogenous social and agroecological zone, the main problems farmers face differ from subak to subak. More than a third of farmers in Soka Candi, for example, struggled above all with loss of soil fertility. This is not considered the primary problem by other subak in the sample. In subak Piling, more than one-third of farmers indicated outmigration of young people as the most important problem; two-thirds of farmers across the Batukaru sample who perceived the loss of youth as the main problem come from subak Piling. It follows that the constraints to and opportunities for organic farming differ by subak, depending on access to markets for organic rice or animal waste for compost, for example.

Government officials involved in the organic farming movement are generally attentive to the diverse range of resources and experience among subak. The head of the department of agriculture in Tabanan regency captured this sentiment, remarking that in Penebel, the department has “supporting factors” in place to facilitate the transition to organic farming. In Penebel, access to irrigation headwaters, fewer problems with pests and disease compared to other districts, and more traditional farm practices all

contributed to successful organic farming. Implemented at a larger scale, in areas that lack these supporting factors, the Cultural Landscape of Bali Province may encounter more intractable problems, including stagnant production. The World Heritage initiative and the broader organic transition in Bali may benefit from the perspective of external agents facilitating the process, including government officials, who recognize this diversity and seek to understand variable dynamics at the local level.

Incremental Change

The response to the problems in Wangaya Betan took the form of incremental experimentation with organic farming. Relative to the duration of the subak in Bali, the transformation over a four-year period was fairly rapid. However, the process of change was the outcome of ongoing and closely-monitored small-scale adjustments, farmer-by-farmer, subak-by-subak. The experience of PT Management Subak Bali illustrates the obstacles to expanding too rapidly, at a scale that is not an appropriate fit with the local context. The process of experimentation and social learning in Somya Pertiwi continues. Gradually building on the accumulative experience of its members, the project has expanded into biogas production, rice marketing, and agro-tourism. Kofinas *et al.* (2007) refer to this as a feedback effect, in that the ongoing experience of successful innovation builds confidence and capacity to experiment and innovate.

Social Networks and Leadership

The nature of the social network was a particularly important component of Somya Pertiwi's success. The project capitalized on linkages with actors both internal and external to the community. The strength of the social network was the relationships that were forged among the various actors, built on trust, collaboration, and the exchange of knowledge and experience. To a great extent, the project depended on the leadership qualities and commitment of key individuals, namely Arisa and Arthawiguna. Increasingly, Arisa became a public spokesperson for Somya Pertiwi, hosting national and international visitors, representing the group in the Bali press, and serving as an ambassador of the program throughout the province. In the past few years, Arthawiguna's leadership in organic farming extended far beyond Somya Pertiwi. While he maintained his high level of involvement in Somya Pertiwi and the Batukaru area, he was increasingly recognized as a catalyst for sustainable agriculture in Bali. In 2009 alone, he represented Bali's agriculture office at international workshops, presented well-received key note addresses at various provincial and regional conferences, and he was identified as a central figure in the World Heritage initiative. For several months in 2009, Arthawiguna not only participated in the World Heritage *sosialisasi*, but changed its tenor. When government officials in Indonesia embark on a new initiative, they engage in a process of "socialization," a tour of sorts to inform communities of interventions that will be introduced. As part of my fieldwork, I attended several *sosialisasi* meetings convened with government officials and subak that were invited to participate in the Cultural Landscape project. Arthawiguna established easy rapport with subak members.

He was born into a farming family, educated in agricultural and ecological science in Indonesia and the United States. Over the years, Arthawiguna has spent incalculable hours with farmers at research various research sites in Bali. Arthawiguna participated in the meetings as an invited guest to a subak meeting, in dialogue with farmers, attentive to their questions, concerns, expertise, and decision-making authority. At one point, a representative of the Ministry of History and Archaeology in Bali, the sectoral unit charged with coordinating and managing Indonesia's World Heritage sites, confided emphatically: "We cannot do this without Pak Alit [Arthawiguna]." The Ministry has little, if any, experience with farming communities and subak. Up to this point, their mandate has focused on the preservation of archaeological sites, largely exclusive of local communities.

The respective roles of Arisa and Arthawiguna in Somya Pertiwi, and, by extension, in the World Heritage initiative, raise two important questions. The first is the extent to which the success of Somya Pertiwi has depended on these key individuals. The second relates to the capacity of the Cultural Landscape project to mobilize leaders at the local level throughout the project sites. How does the World Heritage initiative effectively replicate the success of Somya Pertiwi, which appeared to derive largely from the leadership and personal characteristics of its key actors? In the case of Somya Pertiwi, the role of Arthawiguna was particularly essential during the initial phases of experimentation. To some extent, the project developed an internal inertia as Arthawiguna's energies began to focus elsewhere. Although he continued his close involvement with the farmers, and BPTP research scientists have maintained a presence

at the site, the future success of Somya Pertiwi now appears more dependent on internal leadership and its capacity to continue to forge linkages with external agents (in marketing, for example). It also depends on their capacity to cope with the spectrum of potential risks, such as climate change, market saturation of organic rice, land conversion, and water shortages. Whether or not subak in other Cultural Landscape sites have an “Arisa” or other strong local leaders, or the extent to which this will be necessary is an open question.

Until now, Arthawiguna has effectively navigated the role of translator between subak and government departments charged with implementing the Cultural Landscape initiative. Given the extraordinary demands on his time, however, there is potential for a leadership vacuum. He fulfills multiple professional roles, as a researcher, civil servant, advocate of organic farming, university faculty, honorary resident of Wangaya Betan, and representative of Bali’s World Heritage. As with the role of Arisa in Somya Pertiwi, the extent to which the Cultural Landscape project depends upon the leadership of Arthawiguna is another open question.

While it is clear that Arisa and Arthawiguna have been essential to the success of Somya Pertiwi and the formation of the World Heritage model, it is also indisputable that the organic movement is taking hold across Bali, motivated by several drivers. The problem of declining soil fertility and yield stagnation attributed to chemical inputs has gained widespread attention. At the same time the policy environment has shifted to support organic agriculture, bringing increasing financial incentives and capacity building for conversion to organic farming. Throughout Bali, the interest in and initiation of

organic paddy cultivation at the local level is growing rapidly. Thus, the expansion of organic farming in Bali is underway, parallel to and independent of the World Heritage initiative. Implementation of the Cultural Landscape of Bali Province has the potential to bolster these ongoing efforts, linking local level initiatives to province-wide investments in sustainable rice farming and the resilience of the subak.

CHAPTER 6 THE CULTURAL LANDSCAPE OF BALI PROVINCE: A MODEL FOR ADAPTIVE GOVERNANCE

On June 29, 2012, in the midst of writing this dissertation, the 36th session of the UNESCO World Heritage Committee officially inscribed the Cultural Landscape of Bali Province, or *Warisan Budaya Dunia*, as one of 26 new World Heritage sites. The announcement, which culminates a 12-year endeavor to inscribe Bali as a site, may have come as a surprise to some farmers in Batukaru. This is not because the Balinese committee charged with preparing the nomination dossier did not consult with the subak. Rather, many farmers in the area believed that their subak landscape and water temples had already achieved World Heritage status. As one farmer proclaimed in 2009 to a group of students visiting the rice terraces surrounding the Somya Pertiwi training center, “Look. *This* is World Heritage.”

This perception derived, in part, from the nomination process itself. As early as March 2001, Bali had identified the rice terraces of Jatiluwih as a site of “outstanding universal value” that could potentially be nominated for World Heritage inscription. Outstanding universal value is the pivotal criterion for attaining World Heritage Status. The World Heritage Centre defines it as “cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity” (WHC, 2011: 14). Since 2001, Jatiluwih and the surrounding Batukaru area have received a succession of visitors from the UNESCO World Heritage Centre, the Indonesian Directorate General of History and Archaeology, and the Department of Culture and Tourism, as well as Indonesian and

international researchers and consultants who had participated in the preparation of the dossier.⁵² Often, when discussing the topic of World Heritage with farmers in the area, it became apparent that they assumed this succession of visits and consultations signaled the site's inscription as a World Heritage site. The perception also derived from the significant and outstanding value that farmers themselves attribute to their landscape. It is a value at once material—manifest in the irrigation canals and terrace—and intangible. Beyond the ecological management of the rice paddies, the subak plays a vital role in maintaining Bali's living cultural heritage.

The central focus of the newly inscribed Cultural Landscape of Bali Province is to support the existing subak framework and various government agencies that enable the subak to continue its work of adaptive ecological management. For the Balinese, the subak are more than irrigation associations that ensure abundant food production; they exemplify the ideology of *tri hita karana*. As described in chapter 3, the subak is now vulnerable to a new, entangled set of development pressures. The World Heritage Cultural Landscape initiative provides a mechanism to buttress the capacity of subak, communities, and government institutions to cope with these pressures. This chapter describes the framework for adaptive co-management of the UNESCO World Heritage Cultural Landscape of Bali Province.⁵³ The first section of the chapter briefly describes the history of the World Heritage nomination in Bali. The second presents the legal

⁵² By May 2003, the heads of subak and villages in the Jatiluwih area had signed an agreement to affirm their “willingness and consent for inclusion on the proposed list for Warisan Budaya Dunia.” Surat Pernyataan Jatiluwih-Penebel, 14 May 2003.

⁵³ In writing this chapter, I draw primarily on the nomination and management plan for the Cultural Landscape of Bali Province (IMCT, 2011). From 2008-2009, I was both a participant observer and contributor to this process.

framework for the Cultural Landscape initiative and its coordinating structure, a Governing Assembly comprised of multiple stakeholder groups. Next, I present the process model that describes the iterative phases of project implementation, followed by a description of the strategic priorities outlined in the management plan. The penultimate section assesses various challenges for implementing the cultural landscape plan. In conclusion, I address a question that recurred throughout my research and involvement in preparing the nomination dossier and management plan: what are the perceived benefits of a World Heritage site in Bali?

A. The Cultural Landscape of Bali Province: An Overview

The Cultural Landscape of Bali Province recognizes that today in Bali the subak still manage much of the rural landscape. As discussed in chapter 2, through water temple networks, the subak are connected to functional hierarchies that manage the landscape at various levels, from the individual paddy to the watershed. In this way, the subak effectively coordinate the management of a large and complex ecosystem, which encompasses lakes, forests, rivers, and rice terraces. Essentially, the World Heritage initiative for Bali seeks to support the subak, as a manifestation of tri hita karana, and foster the resilience of the subak landscape (IMCT, 2011).

After extended consideration and negotiation, the World Heritage Planning Committee nominated a cluster of four sites to represent important features of the subak system: the Supreme Water Temple Pura Ulun Danu Batur and Lake Batur; the subak, water temples, rice terraces and living archaeological features of the Pakerisan watershed;

the subak, forest, lakes, temples, and terraces of Batukaru, at the northernmost edge of Bali's irrigated "rice bowl"; and the downstream temple of Taman Ayun, along with the subak directly responsible for its ritual cycles and the associated rice terraces (see description of the study sites in chapter 2.D.) The cluster of sites was selected based on a number of criteria, including historical and archaeological significance, the willing participation of village residents and subak members within the proposed sites and their interest in organic cultivation of native Balinese rice, and the ecological viability of the landscape. All of the sites are considered "intact," in that they have up until now deflected most large-scale commercial development. Together, the cluster of sites exemplifies the functional hierarchies of subak, water temples, terraces, lakes, and forests.

Historical Overview: 2000 to 2012

In the first years of the nomination process, a special team under the Cultural Office of Bali identified two sites for a single nomination. Taman Ayun temple in Mengwi was selected to reflect Bali's unique cultural heritage, and the Jatiluwih subak terraces were chosen as illustrative of Bali's natural heritage. By 2002, the proposed sites were expanded to include various archaeological features along the Pakerisan river.⁵⁴ At that time, a special mission from the UNESCO World Heritage Centre visited Bali to assess

⁵⁴ In 2002, the government of Bali also proposed a fourth site, the *Taman Nasional Bali Barat* (West Bali National Park), which was later removed from the nomination dossier as it did not reflect the newly identified theme of an integrated Cultural Landscape (see Bond *et al.* 2002).

the sites proposed for World Heritage nomination.⁵⁵ The mission recommended that the committee propose a cluster of sites as a coherent Cultural Landscape, rather than individual sites identified as uniquely cultural, natural, or archaeological. In the mission report, this approach is presented as “a reversal of the monumental approach to selection” (Bond *et al.*, 2002: 32). Although the linkages between cultural and natural heritage have been discussed since the initiation of the World Heritage Convention in 1972 as “the combined works of nature and man,” it was 20 years before the concept of “cultural landscapes” became an official category of nomination (Mitchell *et al.*, 2009).

The mission also suggested the common theme of Bali’s cultural landscape as a representation of Balinese-Hindu cosmology, reflected in physical structures, landscapes, and intangible heritage. While the mission report makes no specific reference to tri hita karana, the nominating committee at that time, known as the Technical Working Group, identified it as a philosophy of “outstanding universal value” and the unifying theme around which the nomination was organized.^{56,57} The revised dossier, submitted in 2004, nominated the “Sites of Balinese Cosmology,” organized around tri hita karana (see

⁵⁵ From April 8-21, 2002, a UNESCO World Heritage Centre mission, the International Expert Mission to Bali, convened a Preparatory Meeting with government officials from Jakarta and Bali province for the preparation of the nomination dossier. This mission is distinct from routine assessments and evaluations conducted by ICOMOS.

⁵⁶ Although the mission report (Bond *et al.*, 2002: 31) does not reference tri hita karana specifically, it references to Balinese cosmology and the “saturation of the Hindu-Balinese world with spirits and beliefs” reflected in daily activities and structures. The mission report recommends the selection of World Heritage sites based on cosmological elements that find expression in the landscape, architecture, etc.

⁵⁷ In 2008, the Governor of Bali appointed a new Planning Committee for the Governance of Proposed World Heritage Sites, to follow on the previously appointed Technical Working Group for Bali’s World Heritage. The new 17-member committee chaired by Udayana University Professor I Wayan Ardika, included representatives of all relevant government departments at the provincial and national level and academic experts. While some members of the committee were a part of the previous planning team, several new members were appointed to ensure technical expertise related to the subak, including Dr. Alit Arthawiguna (BPTP) and Dr. Steve Lansing (University of Arizona, Stockholm Resilience Centre). Keputusan Gubernur Bali No. 1139/03-C/HK/2008, 23 September 2008. See Appendix C for a full list of the 2008 Planning Committee members.

chapter 4). After review of the 2004 dossier, the World Heritage Centre identified several points needed to finalize the nomination, including topographical maps, a clearer justification for inscription, and site description. The Centre also indicated the need for a more developed management and monitoring plan for the proposed sites.

In 2006, the Ministry of Culture and Tourism submitted the nomination dossier “Cultural Landscape of Bali Province,” which addressed the points identified in UNECSO’s review of the 2004 submission. The dossier was received by the World Heritage Centre on February 2, 2006, 17 hours after the submission deadline. As a result, the Indonesian proposal did not meet UNESCO submission requirements and was not eligible for consideration. To support the future nomination of the Bali Cultural Landscape, the World Heritage Centre proposed a national workshop on *Updating the World Heritage Tentative List* and dispatched a team to visit to Bali and assist with preparation of the Cultural Landscape of Bali Province nomination.⁵⁸

In early 2007, the Government of Indonesia resubmitted the nomination dossier. In this version, the government of Indonesia proposed (ICOMOS, 2008: 42):

[A] loose cluster of 10 sites, nominated together as the material manifestation of Balinese philosophical thoughts, particularly Tri Hita Karana, ... as representative of the *subak* system of water management.

Of the 10 sites proposed in 2007, one was Jatiluwih and another Taman Ayun—the two sites that were the focus of the original nomination initiated in 2000. The dossier proposed another eight individual sites in the Pakerisan river valley, chosen primarily for

⁵⁸ See: http://portal.unesco.org/geography/en/ev.php-URL_ID=9261&URL_DO=DO_TOPIC&URL_SECTION=201.html

their archaeological significance. Together, the proposed sites were similar to those nominated in 2002, but they were presented under the rubric of tri hita karana.

This revised dossier met all of the technical requirements for nomination to the World Heritage List. It was then transmitted for review by ICOMOS and the International Union for Conservation of Nature (IUCN), advisory boards to the World Heritage Centre. In their evaluation of the proposal, ICOMOS recommended that the nomination be deferred. The first concern was that the nominated sites did not fully reflect the “extent and scope of the subak system of water management and the profound effect it has had on the cultural landscape...over at least a millennia” (ICOMOS, 2008). The nomination would need to better articulate the link between rice terraces, water temples, villages, and forest catchment areas managed by local communities. The evaluation also called for a more appropriate management system. The Technical Working Group was advised to develop a management plan that integrated the central components of Bali’s cultural landscape system. While ICOMOS acknowledged that many of the proposed sites had customary management in place, they also recognized the vulnerability of the subak to the impacts of uncontrolled development. For this reason, the reviewers recommended the augmentation of traditional management systems to integrate national and provincial support for agro-ecological conservation and local welfare.

In light of these recommendations, the Technical Working Group enlisted the expertise of Steve Lansing. As discussed in chapter 2, the work of Lansing and colleagues was instrumental in demonstrating the functional interconnectedness of the subak, water temple network, and irrigated rice farming, as a self-organized complex

adaptive system (Lansing, 1991, 2006). Dr. Yunus Arbi, a member of the Technical Working Group representing the Indonesian Directorate General for History and Archaeology, became familiar with Lansing’s publications on the subak. Subsequently, the nominating committee invited Lansing—and his students—to assist in revising the Cultural Landscape nomination.⁵⁹ The Indonesian contingent was eager to extend the sites to “best and clearly represent the manifestation of Tri Hita Karana, [through the subak], supported by the communities and local authorities to become World Heritage” (Ardika *et al.*, 2008: 7).

Over the next several months, the nominating committee investigated the subak and water temple networks at the proposed sites, supported by government staff from various relevant ministries and student researchers, myself among them. Field teams gathered basic data on the sites, including GIS coordinates, subak membership, irrigation systems, temple network and rituals, associated villages, and farming practices. As the full extent of the functional subak hierarchies became clearer at each site, the previous sites were expanded to invite participation from additional subak, communities, and local authorities. The voluntary participation of subak and communities was a critical concern since the beginning of the nomination process, particularly given the experience with the unsuccessful efforts to propose Besakih temple as a World Heritage site during the previous decade (chapter 2, C).

⁵⁹ I was conducting dissertation fieldwork in the Jatiluwih area, a site proposed for World Heritage inscription, when the Technical Working Group invited Steve Lansing to contribute to the process, in June 2008. In September 2008, three students from the Stockholm Resilience Centre, where Lansing is a Senior Research Fellow, joined us in Bali to conduct thesis research related to the Cultural Landscape of Bali Province: Anna Schmuki, Maria Fernanda Hernandez Cedillo, and Thomas Bergendorff.

In addition to extending the proposed subak and temple networks to more accurately represent Bali's complex cultural landscape, the Indonesian government and the Technical Working Group were keen to develop a comprehensive management plan and proposed creating a new institution to implement it. In dialogue with Steve Lansing, the planning committee was introduced to the Stockholm Resilience Centre and concepts of adaptive governance, which were adopted by the planning committee as a useful management approach. The cultural landscape represented a new kind of World Heritage, one that combined the cultural aspects of the subak and water temples with ecological conservation of the rice terraces and the landscape that supports them.

As discussed in chapter 2, adaptive co-management systems connect individuals and institutions at multiple levels, across autonomous regional authorities (Olsson *et al.*, 2004; Folke *et al.*, 2005; Armitage *et al.*, 2007). They are characterized by a shared vision, manifest in Bali as *tri hita karana*. Adaptive co-management arrangements exhibit a high degree of interaction and collaboration among actors at various scales, and shared control and responsibility—features that exemplify the organizational workings of the subak system. Such arrangements are flexible enough to encourage dynamic social learning, social memory, and experimentation—reflected in the subak and the local-level experience of Somya Pertiwi. Thus emerged the plan for adaptive co-management in Bali.

In early 2009, the Indonesian Ministry of Culture and Tourism submitted a revised dossier that focused on the subak, water temples, and rice terraces. As part of the dossier, the Ministry submitted the Cultural Landscape of Bali Province Management Plan, based

on the principles of adaptive co-management. The nomination was deferred yet again, in 2009 and 2010, on the grounds that maps of the properties were inadequate and the dossier needed to expand its comparative analysis to include other sites in Bali, elsewhere in Indonesia, and the world.

Finally, in November 2011, Yunus Arbi wrote to inform me of the most recent submission:

Yes, after three years now that we have been fixing and revising the dossier and ...management plan. Now we are about to get the final result, putting Bali's Cultural Landscape into the World Heritage List.

In June 2012, after successive evaluations and site visits from ICOMOS and the IUCN, UNESCO announced Bali's inscription on the World Heritage List. During the previous three years of "revising and fixing" the subak-centered dossier, the planning committee had also undertaken the significant work of augmenting the legal and institutional framework for governing the World Heritage site, the mechanisms needed to ensure effective management of Bali's "outstanding universal value."

B. Adaptive Co-Management for Bali's Cultural Landscape: Legal Framework and Coordinating Structure

The Legal Framework

To officially empower the World Heritage initiative, the provincial government established a broad legal framework that codifies conservation and spatial planning within the site boundaries. In December 2008, Governor Pastika authorized a Provincial

Decree that designates a number of Strategic Areas in Bali, including forests, lakes, rivers, and a “Cultural Heritage Zone” that encompasses the Cultural Landscape sites.⁶⁰

This designation legally protected the World Heritage properties, among others, and made them eligible to receive increased levels of government assistance. The Decree was an official binding agreement between the provincial government and the elected head (*bupati*) of each of Bali’s eight regencies.⁶¹

Members of the planning committee advocated for a “strategic” regulation that would enable the World Heritage project to manage the properties as a coherent and integrated cluster of sites. The committee recognized that the strategic conservation areas designated in the governor’s decree are located in regencies and are under their jurisdiction. Yet, any effective conservation strategy would need to be managed by the provincial government, in coordination with the regencies. As discussed in chapter 3, this is problematic given the issue of decentralization and the incentive to fill regional coffers. One committee member observed, “All regencies need to increase income, so they ignore aspects of environment and culture and religion. We need to manage Bali in unity.” In effect, the Provincial Decree secured agreement from the *bupati*, granting the provincial government the authority to oversee the World Heritage sites, to support customary *awig-awig*, and enforce the existing restrictions on commercial development within the designated strategic conservation areas.

⁶⁰ Memorandum of Understanding between Bali Provincial Government and Regency/ Municipality Government of Bali No. 075/06/KB/B.PEM/2008, 30 December 2008, Denpasar. The Provincial Decree is based on National Law No. 26/2007 and National Government Decree No. 26/2008 concerning spatial planning and the establishment of National Strategic Areas for conservation of critical landscapes.

⁶¹ The Mayor of Denpasar Municipality, a special administrative district in Bali, is also a signatory of the agreement.

The Governing Assembly for Bali's Cultural Heritage

With an amenable legal framework in place, the nominating committee turned to the institutional and administrative structure for coordinating the Cultural Landscape sites. The diversity of Bali's World Heritage sites, agencies, and institutions presented a challenge for coherent and integrated management. Moreover, the activities of government agencies in Indonesia are restricted to their designated sectoral mandates. In contrast, managing Bali's complex cultural landscape within the designated World Heritage sites requires integrated collaboration from multiple sectors.

After two years of discussions, the committee established a cross-sectoral and multi-level Governing Assembly for Bali's Cultural Heritage (*Dewan Pengelolaan Warisan Budaya Bali*).⁶² The coordinating structure attempted to implement principles of adaptive co-management and the traditional governance system of the subak, within the framework of Indonesian and Balinese governance systems. The management plan explicitly connected representatives from four main stakeholder groups: subak, customary villages (*desa adat*), government departments at multiple levels, non-governmental organizations, and private sector agencies. Management decisions of the Assembly are to be made by democratic vote, reflecting the democratic governance structure of the subak. Figure 5 presents the organizational structure and composition of the Governing Assembly.

⁶² The Regulation of the Governor of Bali, No. 32 of 2010, officially established the organizational structure of the Governing Assembly for the Bali Cultural Heritage. The Governing Assembly was formed by Governor's Decree of Bali No.281/03-H/HK/2012, dated March 12, 2012.

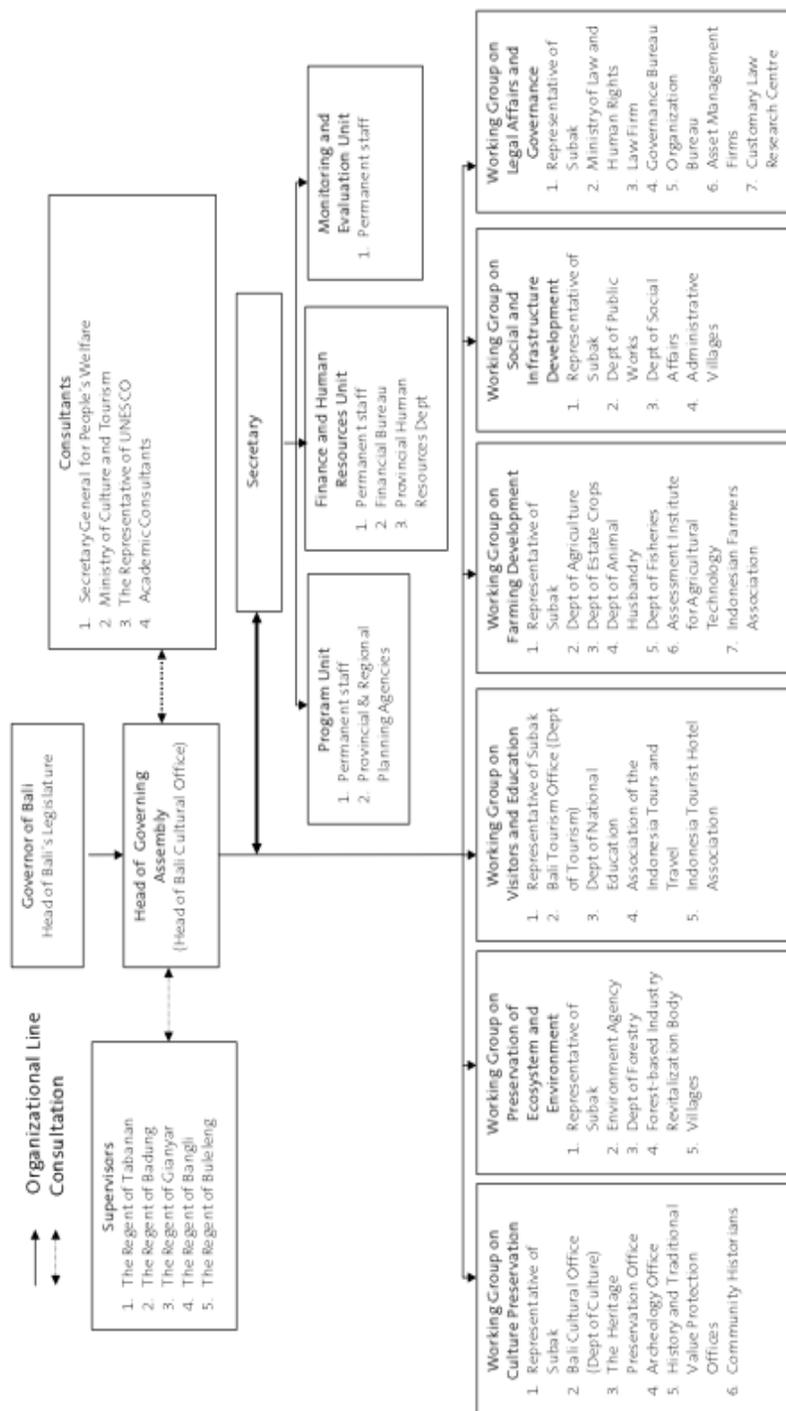


Figure 5. Organizational Structure of the Governing Assembly for Bali's Cultural Heritage

The Assembly is housed in and headed by the provincial Office of Culture and Tourism, the lead government sector. A World Heritage Secretariat was appointed to oversee administrative operations related to planning, finance and human resources, and monitoring and evaluation. Each unit of the Secretariat has dedicated staff, as well as staff representatives from government agencies. Through this arrangement, the World Heritage Governing Assembly seeks to function outside of, but in direct liaison with, each of the relevant government units. The head of the Assembly is responsible to the governor of Bali and acts in coordination with the offices of the bupati of each of the five regencies where the Cultural Landscape sites are located.

The most significant feature of the organizational structure is the thematic Working Groups. The Assembly was organized into six groups, each with the gubernatorial mandate to plan and coordinate activities of the Assembly related to cultural heritage, environment and ecosystem management, education and tourism, agriculture, infrastructure development, or legal affairs. Working Groups are comprised of representatives from the four main stakeholder groups noted above. These include representatives of government agencies and Balinese non-governmental organizations and private sector agencies that have interests in management of the site, such as the Indonesian Farmers Association and the Association of Indonesian Tours and Travel. Each of the 17 subak in the World Heritage cluster will select members as representatives to the Working Groups on a rotating basis. In addition, there are representatives from each of the customary villages, which share responsibility with subak for the upkeep and governance of temples. Together, subak and village representatives outnumber those

from government and non-governmental agencies, thereby helping to ensure that management of the site is, in practice, largely community-based. The subak and communities maintain control over and responsibility for the day-to-day activities of temple and landscape management.⁶³

Following from Geertz (1980) and Lansing (1991), Schoenfelder (2003: 31-34) refers to the relationship between subak, customary village, and local administrative unit as “multicentric.”⁶⁴ In this schema, membership in one group does not determine membership in another and each hierarchy operates autonomously with respect to the coordination of irrigation or village affairs. Intersection between groups (*e.g.*, members from different villages in a single subak) establishes relationships and facilitates the exchange of ideas, information, and practices. Similarly, the Governing Assembly was designed to create linkages among farmers, villagers, and government, and non-government representatives at multiple levels. The composition of the Governing Assembly emerged to ensure that each of the thematic areas, and the potential trade-offs among them, are considered. Each of the thematic Working Groups was charged with developing a set of activities to support its designated priority, in partnership with the other Working Groups. At the time of writing, the Governing Assembly had not yet

⁶³ With respect to community-based management in Bali, the 2002 World Heritage Centre Mission report states: “The complete structure and organisation of villages is geared towards [the] communal task [of care for a socio-culturally important property]; although *community-based conservation* is a term the Balinese do not use, they are very familiar with it—they excel in it, as if it was invented as a term to describe them!” (Bond *et al.* 2002: 32).

⁶⁴ In Schoenfelder’s (2003) configuration, he refers to the *subak*, the *desa dinas* (state administrative village), and the *banjar* (hamlet). A group of neighboring *banjar* comprise a *desa adat*, or customary village, the unit referred to in this dissertation.

convened to exchange information and make collective decisions regarding the management of the sites and the allocation of funding resources.⁶⁵

Lastly, the organizational structure of the Assembly explicitly recognized the contribution of UNESCO and academic consultants. UNESCO, in partnership with numerous international organizations such as IUCN, ICOMOS, and the International Centre for the Study of the Preservation and Restoration of Cultural Property (ICCROM), provides technical assistance for World Heritage sites around the world. These organizations perform functions related to, for example, evaluating nomination proposals, monitoring the state of conservation of sites, and capacity building. Throughout Bali's decade-long nomination process, academic advisors provided support and expertise, including faculty from Udayana University in Bali and the University of Gadjah Mada in Java, Indonesia, the University of Arizona in the United States, and the Stockholm Resilience Centre in Sweden. These external institutions will continue to collaborate with the Governing Assembly, helping to bolster local capacity to implement the management plan and monitor its activities and outcomes.⁶⁶

The Indonesian Ministry for People's Welfare, which coordinates a new National Focal Point for World Heritage, and the Ministry of Culture and Tourism are also among the designated consultants. Within government units, there are direct lines of coordination between the central government in Jakarta and the provincial departments.

⁶⁵ The Governor of Bali (Regulation No. 32, 2010) has allocated operational funding for the General Assembly, through the Department of Culture and Tourism. Additional funding is expected from regency governments, and tourism revenues directed to the World Heritage sites.

⁶⁶ In October 2007, the Stockholm Resilience Centre (SRC) of Stockholm University signed a Memorandum of Understanding with UNESCO to formalize the partnership between the agencies and to expand the scope of SRC's contribution to major UN programs, including the World Network of Biosphere Reserves and the World Heritage Sites.

While the planning committee had addressed the constraints of sector-specific government units at the province level through the Governing Assembly model, integrating across sectors was still a constraint at the national level. The Director General for History and Archaeology, for example, is responsible for cultural heritage, while Forestry has responsibility for strategic conservation areas and forest management. The nominating committee for Bali's World Heritage recognized the value of cross-sectoral adaptive co-management for Cultural Landscape sites throughout Indonesia. Consequently, the Bali process initiated a significant change at the national level, creating a parallel structure for cross-sectoral coordination among relevant government ministries and departments at the national level. A new committee, the Focal Point for World Heritage, was established with two objectives in mind. First, the committee includes representatives from the ministries of Culture and Tourism, Environment, People's Welfare, Forestry, Agriculture, and Public Works. Thus, the national Focal Point is a cross-sectoral unit with expertise in both natural and cultural heritage. Second, representation from each of the relevant sectoral ministries provides direct reporting and funding lines between the national and provincial levels, thereby linking the Governing Assembly of Bali Province to the existing bureaucratic structure at the national level in an arrangement that allows for cross-sectoral management.

Indonesia's Bunaken National Marine Park

In designing the Governing Assembly, the committee looked to the structure of a democratic, multi-stakeholder body that was formed to manage the Bunaken National

Marine Park in Sulawesi, Indonesia. The Bunaken National Park was established as a marine protected area in 1991. Initially, park management prioritized income from tourism over local well-being. Park managers prohibited the use of natural resources by local residents and suspended activities such as fishing and farming within the park boundaries. However, tourism-related activities such as dive tours and construction were permitted. By the end of the 1990s, there was increasing evidence of declining coral reefs and fish populations (CIEL, 2002). Over the next few years, a divers association collaborated with local officials and non-governmental organizations to engage in a consultative process with communities (Christie, 2004). Subsequently, a new governance structure was established, along with a mechanism to more equitably distribute tourism revenues among local communities for conservation activities. Bunaken Park is now governed by a broad-based management assembly comprised of representatives from 30 villages in the park, local tourism operations, fisheries and environmental government agencies, the watersports association, and the marine sciences department of the local university.

The Cultural Landscape planning committee identified several features of the Bunaken structure that it modified to fit the social and ecological context of Bali's World Heritage sites. For example, the majority of Bunaken's management assembly represents local communities, helping to ensure community empowerment. The assembly designates clear lines of communication between government agencies and stakeholders, and the assembly has the authority to call on government offices to implement their decisions. Its members receive annual monitoring and evaluation and budget reports,

which are used to develop annual work plans and conservation priorities. As well, the Bunaken structure facilitates engagement with non-governmental organizations, technical consultants, and donors. The Bunaken Park management system has effectively reversed the previous imbalance among livelihood, conservation, and tourism priorities. The Indonesian Ministry of Nature Conservation has designated Bunaken as a “center of excellence” for training other parks (IMCT, 2011: V-5).

“Bridging Organizations” in Adaptive Co-Management

Bali’s Governing Assembly is an example of what Olsson *et al.* (2007: 3) refer to as a “bridging organization.” A bridging organization creates linkages between “relatively autonomous but interdependent actors and actor groups at multiple levels.” Research in Sweden’s Kristianstads Vattenrike Biosphere Reserve (KVBR), a designated Man and Biosphere Reserve, illustrates how these linkages allow for social learning and multi-directional information flows, considered crucial for fostering social-ecological resilience in complex systems. In the KVBR, an unconnected assemblage of project-specific groups was transformed into an adaptive co-management structure. In the Swedish case, the management structure expanded from a diverse range of individual actors, to a group of actors, to multiple-actor processes (Olsson *et al.*, 2007: 6). As in Bali, the structure emerged as a response to a broad set of environmental issues. Also, as in the Balinese Governing Assembly, the KVBR structure was organized around “theme groups” that address a given issue related to ecosystem services and processes in the KVBR, such as groundwater or coastal sand dunes.

As the KVBR and Bali Governing Assembly both illustrate, linking different levels of governance requires the active role of individuals or organizations to serve as coordinators and facilitators in co-management processes. The Governing Assembly for Bali's Cultural Heritage emerged from networks and processes operating at multiple levels to cope with the imminent problems facing the subak and the landscape. By linking together individual actors and groups, in a way that reflects Bali's particular socio-cultural and institutional arrangements, the Assembly connects diverse stakeholders. It provides an institutional structure and the means (*e.g.*, technical and financial resources) to mitigate the ongoing deterioration of Bali's ecological resources and preserve the balance of *tri hita karana*.

C. A Process Model for the Cultural Landscape of Bali Province

As the organizational structure of Bali's Cultural Landscape emerged, so did a framework for the adaptive co-management process. Figure 6 displays the process of developing the governance structure described above, and the main iterative phases of project implementation.

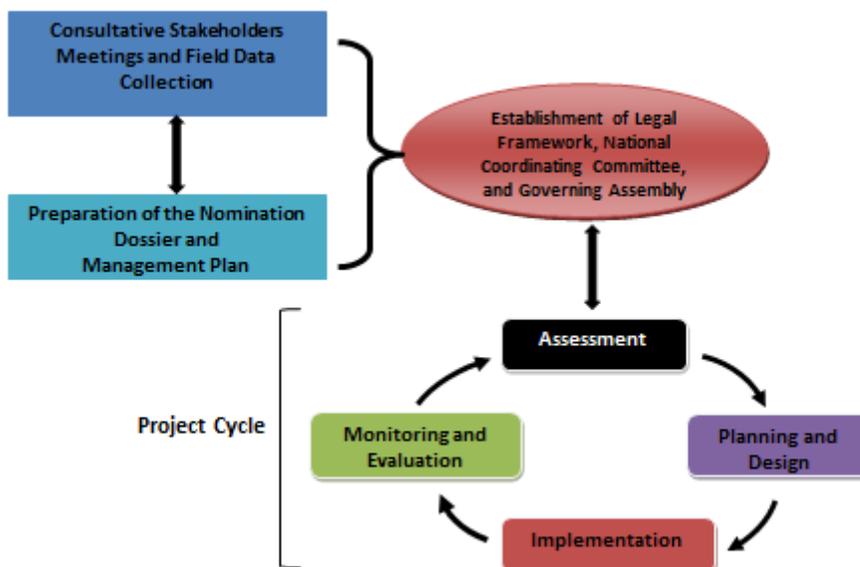


Figure 6. Bali Cultural Landscape Adaptive Co-Management Process Model

The process began with a series of consultative meetings with subak, communities, and government stakeholders throughout potential World Heritage sites, involving both stakeholder meetings and socialization activities with subak and communities. These activities served two purposes. First, they facilitated the collection of basic information for the nomination dossier and management plan. Second, they provided the initial forum for participation among diverse stakeholders at the local level. In this way, these activities helped to identify and frame the strategic priorities of the Cultural Landscape initiative (discussed below). A second and concurrent phase of the project was the establishment of the legal framework and the Governing Assembly (from 2008-2012).

The management plan was developed as a working document to guide a long-term and dynamic process of project implementation, including 1) comprehensive and participatory assessment; 2) participatory planning and design of project activities and annual working group plans; 3) implementation of those activities and workplans; and 4) implementation of a monitoring and evaluation system to assess and integrate social, ecological, and process feedbacks. As depicted in the Project Cycle component of Figure 6, the process is based upon continuous information gathering that translates into small-scale adjustments of the design, planning, and implementation of the project's activities. In this way, the governance framework reflects the process of "feedback learning" and incremental adaptations, characteristics of the subak network and the ongoing transition to organic farming in Wangaya Betan (Berkes and Turner, 2006).

As Folke *et al.* (2003) observe, adaptive co-management is an information-intensive endeavor that requires knowledge of complex social-ecological interactions to monitor, interpret, and respond to ecosystem feedback at multiple scales. The adaptive co-management framework in Bali also emphasizes the role of ongoing assessment, monitoring, and evaluation as a central component of the social learning process. A permanent monitoring and evaluation unit is tasked with establishing a system to assess the project's activities as well as key social-ecological outcome indicators. The Cultural Landscape project is, essentially, an ongoing experiment in adaptive governance. Thus, the project will also document, monitor and evaluate the process itself, and the effectiveness of activities designed to strengthen the capacity of stakeholders to adaptively co-manage the World Heritage site.

D. Strategic Priorities: Livelihoods and Landscape Conservation

To support the subak landscape in Bali, the management plan addressed a range of priorities and stakeholder interests. Unlike the initial experience in Bunaken and other protected areas, the Bali Cultural Landscape explicitly considered both livelihood security and ecological conservation from the outset. In Bali, as elsewhere, these are not distinct objectives, but integrated and desirable social-ecological processes and outcomes. To achieve this, the planning committee defined a set of “strategic priorities” to strengthen the capacity of the subak and villages in maintaining the cultural landscape and mitigate the factors driving a collapse of the system. The priorities also address the anticipated increase in visitors to Bali’s World Heritage attraction. The strategic priorities include: 1) conservation of material culture; 2) conservation and promotion of ecosystem services; 3) education and tourism development; 4) protection and enhancement of agricultural livelihoods; and 5) infrastructure and facility development.

The priority areas will guide the selection of specific activities at each site in the World Heritage cluster. Activities will vary across sites depending on diverse local conditions, farmers’ preferences, and the overarching priorities of the Governing Assembly. Results from the survey of subak members in Batukaru, for example, provide preliminary insight into farmers’ preferences for external government support and suggest potential activities within this area (Table 8). When asked to identify their first priority for government intervention, over half of farmers surveyed in Batukaru indicated support for improvement of irrigation channels as their first priority.

Table 8. Farmer priorities for government support to maintain the Balinese subak

	N	Percent
Improvement of irrigation canals	84	54
Subsidies for organic fertilizer	24	15
Tax incentives for rice farming	15	10
Laws to protect the function of sawah	13	8
Access to credit	8	5
Other	11	8
<i>Total (N=155)</i>	<i>155</i>	<i>100</i>

(Note: Of 156 farmers survey, there is one missing case.)

Another 15 percent of respondents ranked subsidies for organic farming as their first choice. Among those farmers who indicated ‘other’, preferences included road improvements, health and education services, and laws to protect water resources.

As Armitage (2007) observes, the details of a particular adaptive co-management design that works in one community may not work in an adjacent community, or nearby settings with different opportunity sets and livelihood trajectories. To help Working Groups and the Assembly choose and prioritize activities, the management plan called for comprehensive and participatory assessment of the cultural, social, and ecological components at each site. This included an assessment of the vulnerability and capacities of local communities to cope with potential threats, both internal and external (*e.g.*, effects of climate change, water shortages) (see Folke *et al.*, 2005; Adger, 2006).

As mentioned above, field research and socialization meetings conducted during preparation of the dossier laid the groundwork for ongoing local-level participatory

consultation at World Heritage sites.⁶⁷ While the specific activities were not predetermined, preliminary findings from these activities informed discussions with the Governor's Office on a variety of proposals to support subak and communities within the sites. In a special meeting with some members of the planning committee in late 2008, Governor Pastika voiced his strong support for initiatives proposed in the nomination, including incentives for organic farming, funds to support subak infrastructure, subsidies for taxes on rice paddy land, and provision of health care and education for participating communities. As the Governor stated:

Today farmers cannot make ends meet by depending only on the harvest, so incentives must be given, including support for Balinese art and culture. ...When the planting pattern changes, they rush to get more money every day. Their pura is abandoned. This is what we must prevent. We want them to be prosperous. ...That's why there must be incentives. ... The point is if they are included in the heritage site, the world must pay. Education and health, for example, must be free for them.⁶⁸

By 2011, relevant government agencies were reviewing additional proposals to enforce restrictions on deep well construction, assist communities that rely on and maintain forested areas, restore and maintain traditional architecture, and develop facilities and improved interpretation for visitors to the rice terraces and water temples.

⁶⁷ See, for example, Cedillo, 2009. M. Fernanda Hernandez Cedillo conducted thesis research in the Pakerisan area to collect data on the diversity of farmer preferences for adaptive co-management of the World Heritage site. In addition, the Planning Committee tasked various field teams with participatory information gathering with subak and villages (see section A, above). Reports from these field visits provided essential input into the nomination process. (*E.g.*, Keterkaitan situs Das. Pakerisan, Pura Taman Ayun dan Subak Jatiluwih dengan subak di sekitarnya; Laporan keterkaitan Situs/Pura dengan Subak yang Diusulkan Sebagai Warisan Dunia; Kaitan Pura Luhur Pucak Petali, Desa Jatiluwih, Kapupaten Tabanan dengan Subak Jatiluwih.)

⁶⁸ The meeting was held November 10, 2008, in the Office of the Governor. It was attended by Hari Untoro Drajat, Indonesian Director General of History and Archaeology, and several members of the Planning Committee (see Appendix E). I attended as an observer.

The determination of activities to be undertaken by the Assembly, the strategic priorities, and even the themes addressed by the Working Groups were not fixed. Rather, the management plan was conceived as a framework to guide the dynamic evolution of the World Heritage project. Ultimately, the strategic priorities, like the policies and structures related to the initiative, were designed to ensure that subak, villages, and water temple congregations retain control of their institutions and resources.

E. Implementation Challenges

As the initiative moves forward, there are a number of potential challenges:

Participation and community-based engagement. In the context of the management plan for the World Heritage, the term “community-based” refers to the subak and customary villages (*desa adat*) that are said to have developed robust rules and norms for maintaining cultural and natural resources. The success of the project will depend, in part, upon its ability to successfully link and engage participants at multiple levels. Adaptive capacity is more likely to emerge in contexts where participants can meaningfully interact, exchange information, and share power (Armitage, 2007). Similarly, effective participatory approaches that give voice to diverse priorities and constraints at the local level are characteristic of good governance (Folke *et al.*, 2005).

The Cultural Landscape model is centered on the subak, and based on its inner workings as an adaptive, democratic, egalitarian socio-religious and ecological management institution. The World Heritage project itself is housed within a province-level government apparatus. Here, there is a potential contradiction between participatory processes and bureaucratic hierarchies. In the context of Bali, Warren

(1993) argues that the extensive agency of customary (*adat*) institutions, such as the subak, reflects their very integration into administrative hierarchies. As Jha and Schoenfelder (2011: 5) observe, “In Balinese society, this has long been made possible by a twin set of values that allow a hierarchy-obsessed, state-propagated ideology to exist alongside an egalitarian and flexible village ideology in spite of latent tensions between the two.”

The institutional structure of the Governing Assembly is designed to foster broad stakeholder engagement, while maintaining its connection to the administrative bureaucracy. The extent to which the institution adopts a fully participatory culture, working from the bottom up, may influence its long-term success. It will be important to see participation as a dynamic process, one that has the potential for inclusion and enfranchisement from below, but must be understood in the context of the subak and Balinese hierarchical relations (White, 1996).

Leadership. Leadership is identified as an essential mechanism for maintaining the bridging function of institutions. Key individuals can provide visions for ecosystem management and catalyze networks of self-organizing processes (Olsson *et al.*, 2007). In 2008, the World Heritage nomination process shifted its focus to center on the subak. This, in turn, led to the emergence of new leadership within the planning committee. In particular, the committee expanded to include Alit Arthawiguna and Steve Lansing, recognizing their expertise in and long-time experience collaborating with subak. Both Arthawiguna and Lansing have provided what Olsson *et al.* (2007) refer to as

transformational leadership. They have been instrumental in formulating the historical, conceptual, and functional administrative components of the World Heritage proposal and in coordinating a diverse stakeholder network. Arthawiguna has emerged as a prominent figure with the capacity to effectively navigate the Cultural Landscape process at the level of the subak and the various levels of government administration. Lansing's contribution "in harmonizing and finalizing the nomination dossier" is recognized by Indonesia's Minister for Culture and Tourism Jero Wacik (IMCT, 2011: I-1). As a Senior Research Fellow with the Stockholm Resilience Centre, Lansing has provided a bridge between the Centre and the planning committee in developing capacity in adaptive governance. Both Arthawiguna and Lansing remain committed to the project. Of course, the process has relied upon the contributions of numerous individuals and agencies. However, as the initiative moves forward, the emergence of transformational leadership within the Governing Assembly, its Working Groups, and participating subak will be instrumental to its success.

Benefit sharing and livelihood support. Issues surrounding the sharing of benefits from nature underlie debates around access to and use of ecosystem services. The distribution of such benefits presents a core challenge to social-ecological governance (Nkhata *et al.*, 2012). In the Bunaken National Park, for example, a perception that benefits from natural resources and increased tourism revenues were not distributed equally quickly undermined any popular support for the initial protected area arrangement (Christie, 2004). As described above, the development of benefit sharing

mechanisms that channeled benefits back to communities via the park's governing assembly has proven far more successful in the long-term. Similarly, research in Wakatobi Park in Southeast Sulawesi, Indonesia concluded that successful conservation outcomes are more likely to occur when priority is placed on accommodating the livelihood requirements of local communities (Elliott *et al.*, 2001).

The Bali Cultural Landscape model explicitly recognizes the dual objectives of environmental conservation and livelihood security, as well as competing demands on the social-ecological system, particularly those driven by intensive tourism development. The structure of the plan seeks to achieve collaborative responses to the challenges facing the subak landscape. Moreover, the Governing Assembly has established mechanisms for channeling tourism revenue and funding directly to subak and communities. As evidenced from other protected area initiatives in Indonesia and elsewhere, ensuring that these mechanisms work, in transparent and accountable ways, will be important to the effectiveness of the World Heritage initiative.

Policy and resource requirements. Cultivating policy environments and resource streams that support social learning and multi-level collaboration is another formidable challenge to adaptive co-management. Typically, policy makers operate in conventional techno-bureaucratic environments where they face scarce resources. Yet novel institutional mechanisms require both financial and technical resources to build capacity for learning, adaptation, and collaboration. Meaningful interaction, participation, and documentation are time intensive and require technical skills. As Armitage (2007)

observes, the tendency toward top-down, standardized policies and programs as a strategy to reduce costs and increase efficiencies may be problematic for longer-term adaptive governance. Moreover, given resource constraints, agencies are likely to underfund dynamic learning components such as comprehensive monitoring and evaluation. In general, this trend is shifting in international development, with greater resources allocated to monitoring, evaluation, and knowledge sharing. It has become increasingly clear that an appropriate multi-level evaluative framework is imperative for measuring social-ecological change and assessing the dynamic processes that drive outcomes (Mosse, 2005; Plummer and Amitage, 2006; Ostrom, 2009; Plummer, 2009).

To date, the experience with Bali's Cultural Landscape has been promising. The legal framework establishes a budget for operational costs and the institutional structure directly links the Governing Assembly to government entities with fiduciary authority. Over the past few years, the availability of funds for initiatives that complement the Cultural Landscape program, such as organic farming, has increased (chapter 5). In addition, the management framework prioritizes the design of a dynamic monitoring and evaluation system and dissemination of learning through a permanently staffed unit. Developing knowledge and skills for adaptive co-management is also a priority of the management plan.⁶⁹ To strengthen the capacity for adaptive co-management in Bali and at World Heritage sites throughout Indonesia, the Ministry of Culture and Tourism will capitalize on its new partnership with the Stockholm Resilience Centre.

⁶⁹ See the Cultural Landscape of Bali Province Management Plan, section 4.5 (Adaptive Monitoring and Evaluation) and 4.6 (Capacity Building for Adaptive Co-Management of Complex Social-Ecological Systems).

Regulatory enforcement. The Cultural Landscape initiative uses the subak as a model to establish a novel legal and institutional framework at the level of the provincial administration. Throughout the World Heritage nomination process, the provincial government has adopted a number of laws and regulations to protect the island's strategic conservation areas and curb the trend of overdevelopment that threatens the subak landscape, compounded by decentralization. As Fox *et al.* (2005; in Warren and McCarthy, 2009: 234) observe, however:

[I]t is by no means certain that better laws with greater harmonization of legislation along with improved demarcation of jurisdiction will result in more efficient management of Indonesia's natural resources. Decentralization is essentially a political process involving competition among...vested interests.

Given Bali's recent history and the inability of the provincial government to enforce existing regulations that limit development in Green Zones, for example, it is reasonable to question the extent to which the new laws will be effectively enforced. While the provincial government strategically assured agreement with regency leaders regarding the island's conservation areas, it is uncertain that the stipulation will be binding in the current climate, referred to as *budaya uang* (money culture).

Although the socio-economic and political contexts differ, the KVBR project in Sweden addressed political constraints through continuous dialog with all major political interests—a strategy that the Bali project has and will continue to employ. The Bali model attempts to address the underlying conundrum of decentralization in Bali, by ensuring an explicit role of the regency bupati *within* a Governing Assembly structure that gives majority vote to subak and communities. In this way, it creates an opportunity

to increase communication, cooperation, and accountability with government officials whose recent decisions have favored tourism and commercial development over the subak and landscape conservation. It is also hoped that participation with UNESCO, the status ascribed to inclusion in the World Heritage list, and the international research attention that World Heritage bring to Bali will add legitimacy to the adaptive co-management initiative. In this way, World Heritage may provide a mechanism to better enforce regulations to prevent resource despoliation.

The selection of World Heritage sites and the establishment of the coordinating structure evolved through a lengthy process of negotiation, consultation, modification and reorganization—reflective of an adaptive co-management trajectory. The foundation for a flexible, dynamic structure that will foster cross-sectoral and multi-level collaboration is in place. The project is highly adapted to the Balinese context, with respect for hierarchy yet organized around democratic subak principles that favor the equitable distribution of resources to achieve a global solution to ecological problems.

The Cultural Landscape of Bali Province is no panacea for the entrenched political and economic interests that threaten the island and the subak. But, as Armitage (2007: 77) points out, “where the impediments to building adaptive capacity are recognized and addressed, adaptive co-management may provide openings for interaction among disparate groups that might not otherwise engage one another” in solving pressing ecological problems.

Armitage reminds us that adaptive-comanagement is itself an outcome of particular discourses and practices related to participatory resource management, one that should be approached skeptically, particularly when livelihoods are at stake. The Cultural Landscape model scales up local level processes and responses to common pool resource problems to reverse the trend of social-ecological deterioration. Even in small projects, the relationship between project models and outcomes is “complex and obscure” (Mosse, 2005: 230). A project may succeed, but its design is but one determining factor. The adaptive governance model is embedded in the particular historical, socio-economic, and political context of Bali. Thus far, the process in Bali has been, in and of itself, an experiment in adaptive governance. As it continues to unfold, its participants—as in Wangaya Betan—will continue to learn from its incremental successes, partial failures, and ongoing reorganization.

F. Why UNESCO World Heritage?

Throughout the duration of my fieldwork in Bali, government officials and participants engaged in the process at various levels often declared that the Cultural Landscape of Bali Province will go forward with or without inscription as a World Heritage site. I entered the process in its eighth year. Much had occurred prior to my involvement, and there have been significant modifications and milestones in the past few years as well. In the course of my interviews and observations, two things became strikingly apparent. First, a tremendous sense of political will had built up around the project. From the subak to the Office of the Governor, Balinese I encountered advocated

strongly for the Cultural Landscape. This was not always the experience with respect to World Heritage initiatives in Bali (*e.g.*, Pura Besakih described in chapter 2, see Darma Putra and Hitchcock, 2005). In 2008 and 2009, there was extensive discussion among the planning committee to extend the cluster of sites to two additional areas of Bali—Sebatu and the Sideman valley, where functional subak hierarchies faced serious and imminent threats from large scale development projects. While the committee felt that these are critical areas for inclusion in the nomination proposal, they expressed general agreement that for these newly identified sites they did not have sufficient time engender the social and political capital to ensure broad stakeholder support. As a result, these sites were formally proposed as “serial sites” for successive annual nomination to World Heritage, and indicated as such in the management plan. In the nominated sites, the long-term engagement of subak and government officials at all levels was critical to the emergent sense of ownership of the project.

Second, with the escalating environmental problems in Bali, the initial loss of the subak as a functional institution in southern Bali, and the persistent media attention on these issues, Bali seemed to have arrived at a tipping point (discussed in chapter 3) that enabled the emergence of novel governance mechanisms for social-ecological resilience. While the participants in the process organized around the philosophy of *tri hita karana*, this was not the driving force behind the initiative. *Tri hita karana* provided a platform, or enabling environment, to bring diverse stakeholders together and engage in dialogue. Together, these two circumstances, the political will established over years of modifying

the World Heritage initiative and the imminent social-ecological crisis facing Bali, opened a window of opportunity for the Cultural Landscape initiative to move forward.

So, why UNESCO? If the Balinese desired to establish the Cultural Landscape site independent of World Heritage, why pursue the rigors of the nomination process? There did not appear to be a misconception about the tangible, financial benefits of World Heritage status. The World Heritage Centre and its partners have only limited funding available to support primarily training and technical capacity building for managing World Heritage sites. As a planning committee member from the Ministry of Culture and Tourism described, “UNESCO is not a funding agency. It is only providing [support] on how to protect the site. Bringing experts, support for promotion, campaigns, action plans, monitoring based on World Heritage policy... .”⁷⁰

What UNESCO does provide is leverage. World Heritage status conveys to the international community a set of minimum standards for cultural heritage conservation, enabling the Governing Assembly to seek additional complementary funding and technical resources to support the diverse activities proposed in the nomination. More significantly, however, World Heritage status lends *political leverage* to cultural landscape conservation in Bali. World Heritage inscription is an external mechanism the Governing Assembly and participants in the nomination process can use to galvanize political support for conservation. The Head of Bali’s Department of Tourism and Culture expressed the sentiment as: “The subak is conserved because it’s not only

⁷⁰ This is not to understate the value of the technical support available to World Heritage sites in conservation planning, interpretation, and monitoring, for example, but to highlight that monetary gain is not a primary motivating factor for World Heritage inscription.

Balinese people who take care and protect this heritage, but also the world protects it.”

As stated above, subak and villages retain full ownership and control over the sites. The existing regulatory framework in place in Bali, both government and customary, align with or exceed UNESCO’s standards for the “state of conservation of the property.”⁷¹

Participating communities, the Governing Assembly, and the Government of Indonesia hold responsibility for implementing the management plan, which, similarly, surpasses the requirements set forth by the World Heritage Centre (ICOMOS, 2012).⁷² As Anna Schmuki (2009: 2) concludes from her research on the role of UNESCO in the nomination process, the Bali case “provides an example of a global actor supporting self-organized learning processes.” The planning and implementation process for Bali’s Cultural Landscape site resides in Bali. World Heritage inscription augments the political authority of those individuals and agencies in Bali working to enhance the resilience of the subak landscape at a critical moment.

The Ministry of Culture and Tourism expects tourism to increase 20 percent throughout the cluster of sites, with the recognition and additional publicity that accompany World Heritage inscription. As discussed in chapter 2, the number of visitors to Bali has grown at a rapid pace in recent years and the trend is expected to continue irrespective of World Heritage. It is hoped that World Heritage inscription will help government agencies, subak, and communities in Bali better manage the inflow of

⁷¹ See the Chapter Five, Protection and Management of the Property in the Nomination for Inscription on the UNESCO World Heritage List, Cultural Landscape of Bali Province (IMCT, 2011).

⁷² In an evaluation of the nomination on behalf of the World Heritage Centre, ICOMOS (2012: 181) describes the management plan as “innovative and highly aspirational.” Most compelling is the participatory approach to simultaneously support livelihoods and ecological conservation through the Governing Assembly, which ensures that “local communities benefit directly from their heritage.”

tourists, provide incentives for maintaining the cultural landscape that attracts visitors to the island, and create an opportunity to distribute the benefits from increased tourism to the subak and communities that maintain the sites. As UNESCO states in its review of the nomination dossier, if successful, the plan for adaptive co-management in Bali may provide a “model of how the management of complex cultural landscapes can be approached” (ICOMOS, 2012: 182).

CHAPTER 7 CONCLUSIONS

Although there is a growing literature on resilience and collaborative approaches to ecosystem management, there are relatively few empirical case studies on the process of adaptive governance as a mechanism to foster social-ecological resilience (Plummer, 2009). Moreover, previous research offers few empirically-based insights on the conditions that make the emergence of new ecosystem management trajectories possible (Olsson *et al.*, 2010). By analyzing the emergence of an adaptive co-management initiative in Bali, this dissertation seeks to contribute to recent research on institutional governance approaches to enhance ecosystems and social well-being.

Efforts to establish a UNESCO World Heritage Cultural Landscape site in Bali began in 2000. In part, the initiative arose as a collective response to rapid environmental and social change on the island that jeopardizes the centuries-old subak system. In 2008, acting on recommendations from the International Council on Monuments and Sites (ICOMOS), the planning team for the Bali World Heritage project ventured into the terrain of adaptive governance. Between 2008 and 2012—the time of writing this dissertation—the Government of Indonesia and Bali Province enacted a supportive legal framework and developed novel institutional mechanisms, namely the Governing Assembly for Bali's Cultural Heritage, to implement a novel adaptive co-management approach.

In the context of Bali's ongoing experiment in adaptive governance, this dissertation has two main purposes. First, it identifies and explores three primary characteristics that helped foster a new multi-level adaptive governance approach to cultural landscape

management in Bali. These include, first, a widespread perception of environmental crisis on the island, or a tipping point, that triggered collective action and the political will for a new form of ecosystem management. Second, actors shared a common vision for social-ecological management, articulated in the Balinese Hindu philosophy of *tri hita karana*. Findings in Bali highlight the potential of ecological worldviews to catalyze dialogue among diverse actors and create a platform for sustainable resource management, even when those actors maintain varied perspectives and institutional agendas. Third, the new governance approach in Bali was based on existing institutions, namely the *subak*, and local-level initiatives such as the organic farming project *Somya Pertiwi* that are grappling with social and environmental change.

The window of opportunity for adaptive governance in Bali was created, in part, by the occurrence of these three conditions, in a particular time and place. While these were essential factors, the case study in Bali also demonstrates the importance of another element that enabled the project to take hold, that of incentives and the interplay among external and internal dynamics. In particular, UNESCO provided both an incentive to achieve World Heritage status, and an external framework that motivated a long-term process of coordination, dialogue, and reframing of Bali's approach to social-ecological conservation in terms of adaptive governance. Observations from the World Heritage Centre in 2002 spurred the move to organize the World Heritage initiative into a cluster of sites, tied together by the common theme of *tri hita karana*. In 2008, deferment and feedback from ICOMOS motivated the systematic adoption of an adaptive co-management framework, the foundation of which is embodied in the *subak*-water temple

network. The role of UNESCO as an external agent intersected with an internal process of change, driven by actors at the provincial and local levels. The government recognized the necessity of offering a set of incentives to subak and farmers to maintain the unique Balinese landscape, and to government officials and agencies at the regency level that stand to benefit from tourism directed to their respective regencies. With the conditions in place to open the window of opportunity, internal and external incentives played a critical role in providing the political leverage needed to realize the initiative.

The second purpose of this dissertation is to present the working model for the UNESCO World Heritage Cultural Landscape of Bali Province and an analysis of the process through which it emerged. The literature proposes a number of attributes of resilient systems, such as the diversity of functional groups and the capacity to cope with uncertainty and adapt to changing conditions. Resilient institutions tend to feature adaptive governance structures that are decentralized, flexible, and hybrid in nature, bringing together diverse actors and actor groups. Typically, adaptive governance approaches foster dialogue, social learning, and experimentation. In Bali, these features characterize various aspects of the coordinating structure and process for adaptive co-management that has been sustained for centuries.

The governance arrangement for Bali's World Heritage site was not prescribed, but evolved out of creative reflection and protracted negotiations among numerous actors, each bringing to the process a distinct institutional perspective or understanding of the context at a particular level. Of particular importance was the input of those with

intimate knowledge of the nested subak-water temple system and how the subak itself functions as a democratic organization. The Governing Assembly was crafted based on this system, informed by adaptive governance theory and experience from other conservation areas, namely Indonesia's Bunaken National Marine Park. The new governance structure established a semi-autonomous arena for flexible and innovative ecosystem management, while at the same time the structure is connected to and engaged with the existing bureaucracy at multiple organizational levels.

The plan for managing the site provided a flexible guideline to address a set of priorities to support the subak and landscape conservation. The plan drew on principles of adaptive co-management and participatory community development. By supporting paddy farmers at a time when the subak and the landscape are particularly vulnerable to development pressures, the project represented an effort to achieve the dual objectives of protecting and enhancing livelihoods and the agroecology of the rice terraces. The constraints farmers face, as well as the range of choices available to them, differ across and within the various cultural landscapes of Bali's World Heritage site. Thus, the project must respond to this heterogeneity by maintaining a variety of possible options to support the subak, such as the proposed tax subsidies, incentives for organic farming, and access to tourism revenues.

In December 2008, the Ministry of Culture convened a forum to discuss the World Heritage nomination and invite public participation in the process.⁷³ One of the first questions raised during the discussion asked how this initiative was a “solution” to the problem of poverty associated with agriculture—one of the driving forces behind the sale and conversion of paddy land and outmigration of young people from farm-based livelihoods. In Batukaru, for example, the majority of farmers expect their children will work in off-farm occupations. In other areas of Bali, closer to tourist and urban centers, the sale or lease of farmland is far more lucrative than rice farming.

Despite these trends, when asked if they think their subak will last 20 years into the future, almost all farmers surveyed in Batukaru believe it will (94%, N=156). The Balinese subak is a dynamic, adaptive institution that will continue to change. The question is whether it will change such that it maintains its essential characteristics as a resource management institution at the center of Bali’s complex social-ecological system. Remarks by Governor I Mangku Pastika during a meeting to discuss the World Heritage proposal summarize the linkages between the subak and the water temples and their role in maintaining the terraced landscape:⁷⁴

This is what must be understood. This is heritage. Love to God, to humans and to environment, started from *parahyangan, palemahan, pawongan*, which is all done simultaneously. This is heritage. If we love God we must love the environment. This is the basic concept to protect Bali. ... Pura Ulun Sui is praised by farmers. This is related to the subak. ... The land will be fertile if this pura exists. For example, if the function of the land is changed, ... the Pura Ulun Sui will be only a monument. The spirit will disappear.

⁷³ The forum was held on December 3, 2008 at the Puputan Memorial in Denpasar. The meeting was attended by over 150 guests, including heads of subak, water temple priests, customary village leaders, government officials from all relevant departments and administrative levels, and members of the press.

⁷⁴ Refer to footnote 68.

To maintain this system, the World Heritage initiative was conceived as a mechanism to support the subak and its members in adapting to current and future pressures that threaten to undermine the resilience of the system.

Ashrama *et al.* (2007) suggest that, in Bali, conservation paradigms must embrace components of adaptation, reconstruction, revitalization, and utilization. Only in this way, they argue, can initiatives such as World Heritage guide Bali to jagaddhita (prosperity and happiness), guided by tri hita karana. Bali is characterized by its longstanding capacity to selectively adopt, experiment, and transform ideas and practices. Today, this capacity is observed among farmers in Wangaya Betan, just as it drives the World Heritage process.

A foundation for transformative change in cultural landscape management is in place in Bali. The framework for the Governing Assembly has been established; World Heritage inscription has been achieved. However, the success of the initiative will depend largely on the extent to which the Assembly is politically empowered to enhance the capacity of subak, communities, and natural resource managers to adapt and respond to uncertainty and rapid change. For Bali province more broadly, success will also depend on the degree to which the model leads to systemic transformation in social-ecological management beyond the initial World Heritage sites. As the initiative develops, it will provide a fertile site for future research on adaptive governance, to better understand interdependent social-ecological relationships and the evolution of adaptive co-management approaches.

APPENDIX A. GLOSSARY

Adat	Custom, customary, customary law
Agama	Religion
Agama tirtha	Religion of Holy Water; name given to Balinese Hindu religion
Ajeg	Firmly planted; often alluding to the revivification of Balinese culture, religion, and traditional values
Awig-awig	Basic laws of a subak (also for customary communities, temple groups, etc.)
Bendesa adat	Ceremonial head of a local customary community (see Adat)
Beras baru	New rice; hybrid rice introduced since the Green Revolution in the 1970s
Bupati	Head of the regency administrative unit
Desa	Village
Jagaddhita	Individual and communal prosperity, peace, and happiness
Jalur hijau	Government designated Green Zones, or conservation areas in which large scale tourism development is prohibited
Kabupaten	Administrative regencies
Kebalian	Balinese identity, or “Balineseness”
Kelompok Somya Pertiwi	Gifts from the Earth Goddess Group
Krama subak	Subak members
Lumbung beras	Rice granary
Mandala	Cosmic structure or diagram
Masyarakat	Civil society
Odalan	Temple festival
Otonomi daerah	Regional autonomy; a set of laws passed in Indonesia in 1999 to promote decentralization
Padi Bali	Traditional Balinese rice varieties or landraces
Palemahan	Relationship between humans and the environment (see Tri hita karana)
Parhyangan	Relationship between humans and the divine (see Tri hita karana)

Pawongan	Relationship between humans and other people (see Tri hita karana)
Pekaseh	Head of an irrigation association
Pura	Temple
Pura ulun suwi	Irrigation association (subak) temple
Reformasi	Democratic reform
Sawah	Irrigated paddy field
Sedikit-sedikit	Little-by-little
Soewinih	Harvest offerings
Sosialisasi	Socialization; project-related informational meetings
Subak	Irrigation association; the basic cultivation unit
Tempek	Sub-divisions of irrigation associations
Tirtha	Holy water
Tri angga	Three parts, in which all aspects of the cosmos are organized into three components
Tri hita karana	Balinese Hindu philosophy meaning the three causes of prosperity or the good, which dictates that prosperity or happiness can only be achieved through harmonious relations among people and other humans, the natural world, and the divine
Tri loka	Division of the universe into three interconnected and hierarchical worlds
Utama mandala	Highest "mandala" or sacred landscape (see mandala)
Warisan Budaya Dunia	World Cultural Heritage; refers to the UNESCO World Heritage Cultural Landscape of Bali Province
Yadnya	Rituals and deeds in honor of the gods

APPENDIX B. ACRONYMS

BGR	<i>BIMAS Gotong Royong</i> , Mutual Self-help Program
BIMAS	<i>Bimbingan Massal</i> , Massive Guidance
BIP	Bali Irrigation Project
BOA	Bali Organic Association
BPTP	<i>Balai Pengkajian Teknologi Pertanian</i> , Agricultural Research and Technology Assessment Unit
FAO	Food and Agriculture Organization, of the United Nations
GDP	Gross Domestic Product
HYV	High-yielding variety
ICCROM	Preservation and Restoration of Cultural Property
ICOMOS	International Council on Monuments and Sites
IRRI	International Rice Research Institute
IUCN	International Union for Conservation of Nature
KVBR	Kristianstads Vattenrike Biosphere Reserve
Lao PDR	Lao People's Democratic Republic
P4S	<i>Pusat Pelatihan Pertanian Pedesaan Swada</i> , Rural Agricultural Training Center
POA	<i>Pertanian Organik Absolut</i> , Absolute Organic Farming
POR	<i>Pertanian Organik Rasional</i> , Semi-organic Rational Farming
Rp	Rupiah
UNESCO	United Nations Educational, Scientific and Cultural Organization
USD	United States Dollars
WHC	World Heritage Centre
TEK	Traditional ecological knowledge

APPENDIX C. QUANTITATIVE SURVEY SAMPLE SELECTION

Table 9. Batukaru quantitative survey field sites

Subak Name	Associated Customary Village	Tempek Name⁷⁵	Hectares	Number of Farmers	Number of Farmers Surveyed
Jatiluwih	Jatiluwih	<i>7 Tempek</i>	303	515	58
		Gunung Sari			19
		Besi Kalung			5
		Umakayu			10
		Tebalah Gede / Jatiluwih			6
		Kedamaian			6
		Umadui			7
		Kesambi			5
		Soka Candi			Senganan
Piling	Mengesta	<i>12 Tempek, combined</i>	150	246	31
Wangaya Betan	Mengesta		45	90	12
Peseletan	Mengesta		18	48	5
Bedugul	Jatiluwih	<i>11 Tempek, combined</i>	116	211	27
Total			773	1160	156

The following equation shows the *sample size calculation* for simple random sampling for a 95% confidence level (binomial distributions) used in this study.

$$n = (z/\text{standard error})^2 (p) (1-p)$$

n = sample size

z = standard score corresponding to a given confidence level
(z = 1.96 for the 95% confidence level)

p = expected proportion with the characteristic

(1-p) = expected proportion without the characteristic

⁷⁵ A tempek is a sub-division of a subak. For Subak Jatiluwih Gede (Great Subak), the names of tempek were available. Subak Bedugul and Subak Piling also have tempek, though unidentified in our sample.

APPENDIX D. CULTURAL LANDSCAPE OF BALI PROVINCE, STATEMENT OF
OUTSTANDING UNIVERSAL VALUE, 2007 AND 2009[2011]

Statement of Outstanding Universal Value (2007)

The Cultural Landscape of Bali Province is an outstanding manifestation of the unique Balinese cosmological doctrine. It is the tangible reflection of the original Balinese ideas and beliefs with their roots in the *Tri Hita Karana* concept, which is the awareness of the need to always maintain a harmonious relationship between God, Humans, and Nature in daily life. This particular concept is evidence of Balinese creative genius and this unique cultural tradition is a result of long human interactions, especially between the Balinese and Indians. The Cultural Landscape directly demonstrates the capability of the Balinese to make their unique cosmological doctrines real and to practice them in their daily life through spatial planning and land use (cultural landscape), settlement arrangement, architecture, ceremonies and rituals, art, and social organization. Indeed, the implementation of the concept has generated a beautiful cultural landscape. All these achievements deserve to be appreciated as an outstanding universal value. Hence, the sites of the Cultural Landscape of Bali Province warrant inscription on the World Heritage List.

Statement of Outstanding Universal Value (2009[2011])

The subaks and water temple networks of Bali reflect the Balinese philosophical principle *tri hita karana* (“three causes of goodness”), which promotes an harmonious

relationship between the individual and the realms of the spirit (*parhyangan*), the human world (*pawongan*) and nature (*palemahan*). This abstract idea is given concrete realization in the lives of the Balinese through the institutions of subaks (ancient, democratic self-governing farmer's associations) and water temples, which give spiritual meaning to the governance of the rice terrace ecology. Each year, the congregations of the water temples perform an intricate series of rituals, offerings and artistic performances that are intended to sustain an harmonious relationship with their natural and spiritual existence. Over the centuries, the physical landscape of Bali has been reshaped in conformity with these philosophical ideas. Water temple networks have expanded to manage the ecology of rice terraces at the scale of whole watersheds, transforming the volcanic landscape into faceted terraces whose jewel-like perfection creates general prosperity.

Balinese water temples are unique institutions, which for more than a thousand years have drawn inspiration from several ancient religious traditions including Saivasiddhanta and Samkya Hinduism, Vajrayana Buddhism and Austronesian cosmology. The focus of water temple rites is the maintenance of harmonious relationships between humans and the natural world. This is achieved through active engagement with spiritual concepts, emphasizing the dependence of the human community on the life-sustaining forces of the natural world. These ideas are expressed through the musical traditions of various types of orchestra; dramatic performances such as topeng, gambuh, wayang, rejang and baris; the reading of poetry in four languages (Sanskrit, Balinese, Old and Middle Javanese); the creation and dedication of offerings made of flowers, fruits and rice; and the

performance of rituals by priests and the congregation. The temples themselves are continually repaired and embellished by stone masons, sculptors, woodcarvers and painters.

The temple networks represent a unique response to the challenge of supporting a dense population on a rugged volcanic island in a monsoonal area. The mountainous nature of the island with deep ravines and seasonal rains has created an ecosystem that is prone to water scarcity and threats of disease and pests. Water temple networks traditionally cope with these problems by enabling clusters of subaks to adjust irrigation schedules at the watershed scale, controlling pests by inducing synchronized fallow cycles. Although each subak focuses on the management of its own rice terraces, a global solution to water allocation emerges from the temple networks, optimizing irrigation flows for all. This thousand-year-old system is now threatened with collapse, due to development pressure, fragmentation of the landscape, and pollution from agricultural chemicals.

APPENDIX E. CULTURAL LANDSCAPE OF BALI PROVINCE PLANNING
COMMITTEE MEMBERS (2008)

On September 23, 2008, Bali Governor I Made Mangku Pastika appointed 17 members to Bali's World Heritage nomination committee charged with revising the Cultural Landscape of Bali Province nomination dossier. The members included:

Chair	Dr. I Wayan Ardika, Udayana University
Secretary	Head of Culture Office of Bali Province, Cooperation Unit
Members	<p>Dr. I Gde Parimartha, Udayana University</p> <p>Dr. Stephen J. Lansing, University of Arizona and Stockholm Resilience Centre</p> <p>Dr. I Wayan Alit Arthawiguna, Bali Institute of Agriculture Research and Technology Assessment (Bali Ministry of Agriculture)</p> <p>Dr. Daud Tanudirdjo, University of Gadjah Mada</p> <p>Dr. I Gusti Ngurah Anom, Bali Cultural Heritage Expert, former Directorate General of Culture</p> <p>Dr. I Mada Sutaba, Bali Cultural Heritage Expert</p> <p>Dr. Yunus Arbi, Ministry of Culture and Tourism, Directorate of Archaeological Heritage</p> <p>Dr. Ida Bagus Kade Subhiksu, Cultural Board of Bali Province</p> <p>Dr. I Made Suantra, Head of Bali Archaeological Conservation Heritage Office</p> <p>Dr. I Wayan Wardi, Udayana University</p>
Administrative Staff	<p>Dr. I Wayan Muliarsa, Bali Archaeological Conservation Heritage Office</p> <p>Dr. Anak Agung Gede Agung, Bali Archaeological Conservation Heritage Office</p> <p>Dr. I Nyoman Sukarja, Bali Archaeological Conservation Heritage Office</p> <p>Dr. Dewa Nyoman Saraga, Bali Archaeological Conservation Heritage Office</p> <p>Dr. I Ketut Kertayasa, Bali Archaeological Conservation Heritage Office</p>

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