Exploring possible effects that diversity of preferences for the future within communities could have for adaptive co-management

Case study of a community of farmers in Bali, Indonesia

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Exploring possible effects that diversity of preferences for the future within communities could have for adaptive co-management. Case study of a community of farmers in Bali, Indonesia.

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Abstract

Adaptive co-management (ACM) has downplayed the role that diversity within communities could play in management schemes. It has understood communities as groups of persons with similar interests. This thesis attempts to explore some of the consequences that diversity of preferences of the future over social-ecological trajectories within communities could have on adaptive co-management processes. The relevance of understanding this lies in the urgency of finding solutions that promote better resource and environmental management aimed at sustainability. The following work uses scenarios as a way to explore the effects that diversity of preferences within communities might have on ACM processes.
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Acronyms

ACM Adaptive co-management
MEA Millennium Ecosystem Assessment
NGO Non-Governmental Organization
NRM Natural Resources Management
SES Social-Ecological System
UNESCO United Nations Educational Scientific and Cultural Organization
WH World Heritage
WHS World Heritage Site
To my father
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1. Introduction

Bali is currently undergoing a process of social-ecological change. These changes are threatening the continued existence of the cultural landscape of Bali and the *subak* —a social and religious institution that embraces a unique organization of farmers who share the role of water management for growing rice. Subaks have shaped Bali’s landscape through the construction of rice terraces and their associated ecosystems.

The following have been identified as major threats to the welfare of the area and its inhabitants: 1) the cumulative effect of the over-use of agrochemicals, leading to loss of soil fertility, 2) uncontrolled expansion of tourism, which leads to the sale and fragmentation of the rice terraces, 3) loss of forest cover and consequent water shortages, 4) low price of rice (Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009:III-5), and 5) low income from rice farming (Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009:IV-2).

In order to protect Bali’s cultural landscape, which is intrinsically connected to the *subak*, the Indonesian government has ongoing plans to nominate the area as a World Heritage Site. On February 2009, the Indonesian government submitted a dossier to UNESCO with the intention of nominating five clusters of sites, under the name of: *The Cultural Landscape of Bali Province*. In this dossier, the government stated its willingness to develop a management plan for the site based on the principle of adaptive co-management, through which several stakeholders might be involved in the management of the social-ecological landscape in Bali:

“This management plan is based on principles of adaptive co-management by diverse stakeholders of a complex social-ecological landscape (Folke et al 2002a, 2005; Berkes and Folke 1998; Adger 2006). This system of adaptive governance connects individuals, agencies, and institutions at multiple institutional levels and across autonomous regional authorities (Young 2002; Pretty 2003; Galaz 2005; Hahn et al. 2006). It is based on the principles of dynamic learning, collaboration across institutional levels, and flexible management systems—features that characterize the subaks of Bali as proposed in the Cultural Landscape of Bali nomination dossier.” (Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009:1-2)
Adaptive co-management is an emerging approach for the governance of complex social-ecological systems (SES) in natural resources management. By merging “the iterative learning dimension of adaptive management and the linkage dimension of collaborative management in which rights and responsibilities are jointly shared” (Olsson et al 2004) a new framework for management is brought into being. The theory of co-management recognizes that multiple actors (i.e. government, NGOs, resource users, etc.) can have diverse interests based on different value systems, perceptions and backgrounds. However, diversity within groups has been downplayed in this theory.

Currently, the nomination dossier on the cultural landscape of Bali addresses the diversity among the multiple groups of stakeholders involved in this nomination. However, little attention is paid to the reality of varying perspectives and interests within communities. An example of such is a community of farmers in Bali whose livelihoods depend upon the natural resources within the areas nominated for UNESCO preservation.

Assuming that all actors within a group have similar interests regarding the use and exploitation of natural resources could potentially lead to problematic consequences for adaptive co-management regimes. Scholars from collective action have proved that heterogeneity of interests within a group can be detrimental for cooperation (Baland and Platteau, 2000).

With these scenarios in mind, a particular question must be asked regarding the delineation of diversity and homogeneity among actors. What are the consequences of neglecting the diversity, in terms of interests for the use and exploitation of natural resources, within these groups when dealing with adaptive co-management schemes?

1.1 The Role of Communities in the co-management literature

The literature on co-management has defined ‘community’ as small space units where people share norms and institutions (Capistrano 2005 in Fabricius et al. 2007). It assumes that, as a consequence of homogeneity, communities will search for
cooperative solutions regarding the use of natural resources (Agrawal and Gibson, 1999). Several authors from the natural resources management (NRM) field have criticized this definition arguing that communities cannot be considered homogenous (Agrawal and Gibson, 1999, Borrini-Feyerabend et al. 2004, Carlsson and Berkes 2005). Instead, they propose understanding community as an integration of different groups with varying interests (Carlsson and Berkes 2005); bearing in mind that, within a community it is possible to find some groups that will seek for conservation while others will argue for economic growth and development (Borrini-Feyerabend et al. 2004). This is the case for a cluster of farmers in Tampaksiring village, a rural area located in the central region of the island of Bali, Indonesia. These farmers have shared the same religion, ethnicity, cultural background and values for centuries i.e. they are homogeneous; yet, they have varying interests regarding the use and exploitation of the region’s natural resources.

Consequently, several questions arise regarding diversity of interests within culturally homogeneous communities. For example, why is it important to take into consideration diversity of interests within communities in the context of conservation, especially within homogeneous ones? What are the practical and theoretical implications of considering communities as groups of people with different interests?

### 1.2 Aim of the thesis and research questions

The aim of this thesis is to elucidate some of the consequences that diversity of preferences for the future within communities might have for adaptive co-management, specifically when these differences arise within a homogeneous one. In order to narrow down the scope of this project, this thesis will focus on the diversity of preferences for the future of natural resources within a community of farmers in Bali in Tampaksiring village. To limit this study, I focused on three farming communities where I conducted my field research: *subak* Pulagan, *subak* Kumba and *subak* Kulub. These three *subaks* are part of one of several clusters of sites to become part of the nomination: The Cultural Landscape of Bali Province.

The following overarching question is addressed:
• Is diversity of preferences for the future within a community of farmers relevant for the adaptive co-management process of the Cultural Landscape of Bali Province? If relevant, how so and to what extent do these varying interests and hopes for their socioeconomic futures affect the adaptive co-management of the Cultural Landscape of Bali Province?

In order to answer this general question the following sub-questions were answered:

• Is there diversity within this apparently homogeneous community?
• What does this diversity look like?
• Which specific aspects of adaptive co-management are affected by this diversity and under what conditions?

In order to answer the previous sub-questions, I will first address the issue of whether or not farmers within the same community in Bali have similar preferences for the future. Secondly, I will explore what these preferences are. Scenarios are used as means of presenting and analyzing the diversity of preferences for the future within the Balinese case study. Based on these results, I will elaborate on how diversity within communities is relevant for the process of adaptive co-management of the Cultural Landscape of Bali. Considering that the Balinese farmers depend on the area’s natural resources for their livelihoods, this question is highly relevant to the issue of management strategies and the designation of UNESCO heritage sites.

In this thesis, I propose that even in cultural, religious and ethnically homogeneous groups diversity can be found in the form of different perspectives, interest in and hope for the future. I argue that diversity within communities has been downplayed in the literature. I use the combination of field research and scenario analysis to illustrate that there is a clear diversity in preferences over possible social-ecological trajectories for the area among farmers. Then, I discuss how in a practical and theoretical way this diversity has a critical role in the appropriateness and success of adaptive co-management. Specifically, I argue that diversity of preferences for the future within a community can 1) hinder cooperation, 2) affect the adaptive capacity of a SES and other elements of adaptive co-management such as social capital, social learning, and social trust and 3) make a system more vulnerable to external shocks.
1.3 Why is diversity of preferences interesting from a theoretical perspective?

All around the world natural resources are being degraded or depleted at an unprecedented rate. This rapid devastation has promoted the search for solutions aimed at protecting them. Such solutions include conservation and improvement of environmental management (Berkes et al., 2006).

Decades ago, plans aimed at conservation idealized the existence of pristine ecosystems that needed to be safeguarded from human depletion. This type of conservation practices usually neglected the existence of communities that live and make use of natural resources in such areas. Years later, it became evident that this type of conservation was not achieving the results expected. Therefore, it was necessary to rethink the paradigm of conservation and include local communities in management schemes aimed at protecting ecosystems. Consequently, communities that live and depend on natural resources were integrated into conservation schemes. These communities were able to take decisions regarding the area in which they live and become engaged in natural resource management (Berkes, 2004).

The inclusion of communities into the management of natural resources required thinking about more complex systems of governance than the existing ones. The government was no longer the only actor involved in conservation schemes. Furthermore, this new type of environmental management focused not only on one area of the public administration but rather included as many as possible in order to be able to deal with the diversity present in the social-ecological system subject to management. Therefore, the integration of different government agencies as well as various actors in society connected at different levels from local to global was a natural step in this type of management.

Despite the good intentions of the theory, this integration of different actors with different ideas, goals, worldviews and values in environmental management schemes has not been easy. The former requires agreeing on targets at which to aim
management. In many cases, these goals even compete with each other. The rate at which natural resources are being degraded requires solutions that work i.e. management systems that achieve their goals. Therefore, studying how diversity of preferences could affect the adaptive co-management of a social-ecological system becomes relevant.

The following thesis is divided in five sections. The first includes a review of the literature of adaptive co-management, focusing on the treatment of the concept of community. The second gives a general overview of the current and historical context of Bali. It explains the main characteristics of the subaks and focuses on the case study site, followed by a historical synopsis of the UNESCO World Heritage nomination. The third section accounts for the methods used in this thesis. The results from both the literature review and the interviews are presented in the fourth section as scenarios. Finally, I dedicate the last section for the discussion and conclusion of the said research.

2. Literature Review

The following section aims to present several theories and concepts that have been used throughout this thesis. One of the primary theoretical frameworks drawn upon in this research, adaptive co-management (ACM) is reviewed, followed by the role of diversity in the ACM literature. The conceptual framework of resilience within adaptive co-management is elucidated to illustrate the role of individual preferences in this theory. Co-management, as a facet of adaptive co-management, is also relevant in the sense that the preconditions required in this theory, such as sharing a common vision, play a central role in the argument of this thesis. The treatment of community within co-management theory is also reviewed. Finally, the concept of heterogeneity, borrowed from common-pool resources literature, is explained and defined in order to explore the implications of diversity in co-management schemes, particularly in terms of cooperation. In sum, here I argue that the literature of ACM has downplayed the role that social diversity could play in the theory in terms of influencing actors’ cooperation aimed at safeguarding the environment, the adaptive capacity of a SES
and several attributes of ACM such as social capital, social trust, learning, and social memory.

2.1 Adaptive co-management

Adaptive co-management has become a popular approach in natural resources management. By merging the principles and practices of co-management and adaptive management (Armitage et al. 2009:95) it “brings together collaborative and adaptive approaches in pursuit of sustainable resource use and social-ecological resilience” (Plummer and Armitage 2007:62). Resilience is the capacity of a system to absorb or tolerate changes or disturbances without turning into a different state (Gunderson and Holling in Kearney and Berkes, 2007; Walker et al., 2004). Linked to this concept is adaptive capacity defined as “the ability of social actors or systems to cope with change or disturbance and/or learn through uncertainty” (Armitage et al., 2007:328).

Adaptive co-management can be defined as “a process by which institutional arrangements and ecological knowledge are tested and revised in a dynamic, ongoing, self-organized process of learning by doing” (Olsson et al. 2004). Adaptive co-management also means that power and responsibilities are shared among different actors across different scales that work in a collaborative way while immersed in a learning process (Olsson et al. 2004, Ruitenbeek and Cartier 2001). Such actors generally include natural resources users, government agencies, NGOs and local communities (Olsson et al. 2004).

Adaptive co-management takes into account characteristics such as group decision-making, incorporation of diverse views, learning, adaptability, renewal and transformation. Within the realm of governance, concepts such as trust building, institutional development, and social learning are also included in this theory (Folke et al. 2005; Campbell et al. 2006 in Armitage et al. 2009). Learning in ACM is understood as “the collaborative or mutual development and sharing of knowledge by multiple stakeholders” (Armitage et al., 2007:330).
Adaptive co-management embraces three different interconnected components: an ecological component, a livelihoods component and a process component. Thus, adaptive management should ideally lead to a desirable ecosystem configuration that incorporates these three components without favoring one over the other. (Armitage et al. 2009)

2.1.1. Diversity and Adaptive Co-management: Social Memory, Social Trust and Social Capital

Diversity is a concept that encompasses a wide range of dimensions within the concept itself. Long crucial to the fields of biology and ecology, the study of diversity has recently gained relevance and popularity within the area of resilience research. Studied from a biological perspective, diversity has a functional role as a source of resilience in ecosystem renewal and reorganization (Low et al., 2003:107). From a social perspective, diversity has been analyzed in the context of institutions and societies. Low and others (2003) suggest that diversity and redundancy of institutions play an important role as a source of resilience due to their overlapping functions across organizational levels.

Diversity also plays a role in social memory. Social memory, at a very rudimentary level, relates to common-held ideas about past situations, experiences, and has the function of incurring emotive memories within communities. Social memory also plays an important role in the adaptive co-management process. Within resource management literature, it is more specifically defined as an arena in which past experience of management practices is “actualized through community debate and decision making processes into appropriate strategies for dealing with ongoing change” (Folke et al. 2005:453).

Finally, social capital is linked to adaptive co-management in the sense that is related to building trust. Social capital in this thesis is understood as “the social norms, networks of reciprocity and exchange, and relationships of trust that enable people to act collectively” (Armitage et al., 2007:330). Folke and others have hypothesized that diversity among social roles of agent/actor and team/actor groups “provide[s]
resilience for reorganization, allow[s] for novelty, and thereby enhance[s] adaptive capacity in the face of disturbance and crisis” (2005:455). However, social capital and social memory might be eroded when “different cultural value systems, worldviews, and discrepancies in conceptualization are brought together and interact” (Folke et al., 2005:455). The response from the social-ecological system in times of crisis and surprise will depend on the levels of social capital and social memory. A social-ecological system with low levels of social memory and social capital might become vulnerable while one with high levels of the mentioned elements may result in new governance forms (Folke et al. 2005)

2.1.2 Resilience thinking within adaptive co-management

A very important aspect of adaptive co-management is its use of complexity in social-ecological systems. This means that systems are not linear but rather they act in uncertain and unpredictable ways, “continuously adapting and changing to environmental feedback” (Plummer and Armitage, 2007). The fact that systems are complex and can change quickly has motivated the use of resilience thinking as a conceptual framework for the management of social-ecological systems.

Resilience thinking has proven useful for evaluation of adaptive co-management. Its approach is based on the identification and analysis of slow and fast variables within complex social-ecological systems. Slow variables are responsible for structuring the system dynamics, while fast variables can trigger change in a system. Connectivity in forested ecosystems, long-standing institutions, or values in social systems are some examples of slow variables, while insect outbreaks in forest ecosystems and individual preferences in social systems exemplify fast ones (Gunderson and Holling 2002 in Plummer and Armitage, 2007)

The theory of co-management considers communities to be homogeneous. One of the consequences of delineating communities as a group, with unified interests, and not as the sum of individuals is the neglect of individual preferences and the importance of such factor on the larger group. Individual preferences in social systems are fast variables that could rapidly trigger changes within the system, possibly leading to a
potential change of the overall system (Plummer and Armitage, 2007). For this reason, the analysis of these preferences, understood in this research as preferences for the future in local communities, becomes so important. They allow for the identification of processes that might destabilize the social-ecological system in these Balinese communities.

From a theoretical perspective, adaptive co-management must pay close attention to the comprehension and analysis not only of individual preferences in social systems but also to the role that such preferences and diversity play in the management process. As previously described, individual preferences can act as a fast variable that could lead to change in an ecosystem. By introducing a resilience-thinking framework into the adaptive co-management theory, social-ecological systems are redefined as complex ones. This implies that fast variables such as individual preferences could become an important focal point within this theory, as they shift and incur feedback in a variety of ways. Though this theory accounts for the importance of fast variables, there is still much to be understood and explored in regards to the interconnection between slow and fast variables within communities; more specifically, between the fast variable of individual preferences and the slow variable of social institutions and common values.

2.1.3 Co-management

Co-management within the natural resources management (NRM) field refers to the distribution of power, rights and responsibilities between multiple parties including: government, communities and other stakeholders regarding management of natural resources (Plummer and Fitzgibbon, 2004). Collaboration between these parties, mainly focusing on government and local communities, is central to this theory (Plummer and Fitzgibbon, 2004). Some of the principles common to co-management identified in Plummer and Fitzgibbon (2004) can be divided into 1) antecedents or preconditions, 2) characteristics and 3) outcomes. These components are relevant for analyzing the way in which diversity within communities might impact co-management strategies. Theoretically, based on the preconditions existent in a particular system, we can identify: a real or imagined crisis within a social-ecological
system, willingness for local users to contribute, opportunity for negotiation and a common vision. This last attribute becomes relevant because having diversity of preferences within communities can affect reaching a common vision.

2.1.3.1 A definition of community

Co-management theory has defined community as a “fairly small group of people, who share a common place of residence[,]…a set of institutions” and have something in common (Capistrano 2005 in Fabricius et al. 2007). According to Agrawal and Gibson (1999), proponents in the field of NRM have understood community as a spatial unit with a homogeneous social structure that shares norms. This definition, which focuses on the community as a whole, is not adequate to address differences within communities and neglects the dilemma of “how these differences affect resource management outcomes, local politics, and strategic interactions within communities, as well as the possibility of layered alliances that can span multiple levels of politics” (Agrawal and Gibson, 1999:633).

One of the NRM’s most typical characterizations of communities consists of a set of “similarly endowed (in terms of assets and incomes), relatively homogeneous households who possess common characteristics in relation to ethnicity, religion, caste, or language” (Agrawal and Gibson, 1999:634). Consequently, NRM scholars have assumed that this community homogeneity automatically leads to “cooperative solutions [that] reduce hierarchical and conflictual interactions, and promote better resource management” (Agrawal and Gibson, 1999:634).

For Agrawal and Gibson, homogeneity of communities is easily assumed due to the existence of “people living within the same location [that] may…hold similar occupations, depend on the same resources, use the same language, and belong to the same ethnic or religious group” (Agrawal and Gibson, 1999:634). The three communities of study in this thesis could easily be presumed to be homogeneous given that they all live in the same area, speak the same language, belong to the same religious group, hold the same occupation and depend on the same natural resources. However, regardless the similarities or shared characteristics within a group, this does
not automatically translate into homogeneity of preferences for the future of the social-ecological system (Agrawal and Gibson, 1999). Quite the opposite, as many natural resources studies show, several groups or subgroups of individuals with different preferences for resource use and distributions can be found at the local level (Agrawal and Gibson, 1999).

2.1.3.2 Are communities entities with unified interests?

Several authors argue that co-management has idealized both the concept of governments and community as entities with unified interests, neglecting the idea that they might have multiple faces that can evolve during time (Carlsson and Berkes 2005, Borrini-Feyerabend et al. 2004). According to them, definitions of community within co-management usually do not capture the complexity of its elements. This complexity can be found within the state, communities and in the ecosystem itself, and consist of multiple interests the State and the communities might have, as well as those of their component parts (Carlsson and Berkes 2005).

For example, even though a government has committed to achieve the *Millennium Development Goals*, different ministries could have diverse interests not aimed at ensuring environmental sustainability. While the Ministry of the Environment could search for conservation of some particular ecosystem, the Ministry of Economy could plan for development in the same area. Hence, the State cannot be considered as a unity (Carlsson 2000 in Carlsson and Berkes 2005).

2.1.3.3 Different voices or a unified actor?

Despite the former criticisms, the theories of co-management and adaptive co-management have not addressed the issue of how differences within groups might affect co-management of natural resources. Some authors have elaborated some arguments, which recognize that even among what can be described as homogeneous groups, stakeholders may have different worldviews and interests regarding natural resources management (Borrini-Feyerabend et al. 2004).
Borrini-Feyerabend and others (2004) argue that homogeneity of interests within groups of stakeholders is a desirable condition towards which co-management schemes should set their mark. However, in cases where homogeneity is lacking, the outcome of the management scheme should be able to reflect this heterogeneity. In other words, “where the local communities are highly differentiated internally, their representatives in the participatory management body need to reflect that diversity” (Borrini-Feyerabend et al. 2004:338). Similarly, sometimes communities speak as a single voice regardless of the diversity of interests, while, at other times, the diversity of interests within a group can be openly displayed.

According to Agrawal and Gibson a solution concerning the treatment of homogeneous communities in NRM studies necessarily implies a more holistic approach focused on the “multiple interests and actors within communities, on how these actors influence decision-making and on the internal and external institutions that shape the decision-making process” (1999:629). In this context, “community-based conservation initiatives must be founded on images of community that recognize their internal differences and process, their relations with external actors, and the institutions that affect both” (Agrawal and Gibson, 1999:630).

Another important aspect that should be taken into consideration regarding homogeneity within communities is how interests can change over time (Borrini-Feyerabend et al. 2004). For example, one community that seems homogeneous today might become heterogeneous in terms of their preferences of the social-ecological system in the future and vice versa. This is important in the sense that adaptive co-management is understood as a process rather than as a static result (Carlsson and Berkes, 2005).

To sum up, communities should not be considered homogenous based purely on shared characteristics. Furthermore, it should not be assumed that they will act cooperatively regarding the use of natural resources. Even homogenous communities can have different interests regarding the use of natural resources and, moreover, these interests could change in the future. Assuming that communities are homogenous rather than heterogeneous (regarding their preferences and interests for the future), and also presuming that they will aim for cooperative solutions might
have implications for the implementation and success of management plans and organization. As stated earlier having different preferences for the future can affect arriving to a common vision which is one of the antecedents for co-management.

2.2 Heterogeneity in common-pool resources literature

Within common-pool resources literature, authors have focused on two explanatory variables that affect cooperation: the number of actors and the degree of heterogeneity among them (Keohane and Ostrom, 1995). Heterogeneity is described as a “variation across actors on some significant attribute” (Snidal in Keohane and Ostrom, 1995:62) and can be witnessed in various ways, from the capabilities and skills of actors to their individual preferences. Consequently, different expressions of heterogeneity within a community might simultaneously affect levels of cooperation (Keohane and Ostrom, 1995).

Several empirical studies have endeavored to find a relationship between heterogeneity and collective action. The results of these studies are not prolific enough to affirm that heterogeneity hinders cooperation. As noted out by scholars of international relations, knowledgeable in the cooperation of states: the relationship between heterogeneity and cooperation at the local level also depends on different types of heterogeneity existent therein. While some types of heterogeneity can hinder cooperation, others may promote it. For example, a strong common interest to provide a public good exists between several states. The heterogeneity within this group varies in the sense that some actors have a more pressing interest in the development of said public good. While the levels of heterogeneity of interest vary between these states and actors, this type of heterogeneity can prove beneficial for the provision of the public good. However, if states differ in regards to which public good should be provided, heterogeneous preferences inhibit cooperation. (Snidal in Keohane and Ostrom, 1995:64)

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1 Common pool resources are characterized as “the use of the resource by one individual [that] may have adverse consequences for others.” (Keohane and Ostrom, 1995:13)
Regarding communities, some CPR scholars argue that homogeneity, understood as the sharing of characteristics and common factors that tie communities together, facilitates cooperation. A common language, a common sense of identity and history are other communities’ characteristics that lower transaction costs and therefore facilitate cooperation (Snidal in Keohane and Ostrom, 1995:65). Another attribute within communities that eases cooperation is scale. Since small groups tend to be more homogeneous than large groups, it is assumed that smaller communities are also more homogeneous. However, others argue that even at a community level, interests among community members differ to such an extent that unified action is rarely possible (Gregersen et al., 1989 in Baland and Platteau, 2000).

One type of heterogeneity related to this thesis is heterogeneity that might arise from “differences in the nature of the interests various individuals may have” (Baland and Platteau, 2000:302). According to Baland and Platteau this type of heterogeneity could present an obstacle to collective action. Having different interests in regards to the management of a particular resource might prove problematic in defining a common objective and goal for resource use among the group. Baland and Platteau extend their argument by pointing out that this heterogeneity of interests can be boosted when some individuals from the same community have alternative income-earning opportunities and when they “reside outside of the area where the resource is located” (2000:303). The incidence of conflicts of interests between men and women in some parts of Africa, regarding the use of village commons, illustrates the scenario described by Baland and Platteau. In this case, the men are willing to “clear forests to open new fields for cultivation while women want to preserve them as a permanent source of firewood” (Freudenberger and Mathieu, 1993 in Baland and Platteau, 2000:304). Subsequently, whenever heterogeneity of interests within a community exists, a process of negotiation, followed by agreement, must take place (Baland and Platteau, 2000).

Within the adaptive co-management framework, the potential reality of heterogeneity, understood in this thesis as the diversity of preferences for the future of the SES, within a group could inhibit collective agreement on common goals and interests. Such a possibility is critical for this thesis as diversity of preferences within a group
may make it difficult to reach a common vision about the use and management of natural resources.

In summary, one aspect of adaptive co-management that could be affected by diversity of preferences for the future is collective action. Diversity of preferences for the future in Bali can affect the community’s acceptance of the UNESCO nomination and consequently its willingness to cooperate with the government and other international agencies aimed at conservation of the cultural landscape. The fact that there are different opinions regarding the use and exploitation of natural resources in an area within a community itself needs to search for agreements where actors commit themselves to a common vision for the future.

Diversity of preferences for the future can also affect other aspects of ACM. It can affect the adaptive capacity of a SES. By having diversity of preferences for the future, social actors within a system can increase their ability to cope with change. The way in which social capital, social trust and social learning can be affected by diversity of preferences will depend on the existing institutions. Finally, diversity of preferences in combination with some specific drivers of change could make a system more vulnerable to external shocks.

3. Case study

The following section illustrates the social, ecological and economic situation in Bali and the context for the specific case studied. First, traditional agricultural organizations in Bali called subaks will be described in detail. Secondly, several changes, which occurred in the past few decades and are currently reshaping the province, will be shown. This section will be followed by the description of the area of study, which includes three subaks located in close proximity to Tampaksiring village. Finally, the last section will focus on explaining the nomination of several temples and rice fields as UNESCO World Heritage sites, in a governmental measure aimed at conservation in the proposed areas.
Bali, an island located in the Indonesian archipelago, is considered a popular touristic center characterized by its arts and its picturesque rice fields. Approximately 3 million people inhabit the island. However, since the 1970s Bali has begun to change dramatically due to an increase in tourism and new agricultural practices commonly referred to as the Green Revolution\(^2\). These changes have not only impacted the island’s natural landscape, but they are also modifying Bali’s most important socio-economic units: the subaks.

### 3.1 Subaks

The subak is a unique organization of farmers intrinsically connected to the cultural landscape and to Balinese identity. They are considered one of the most outstanding and complex water management systems in the world. These agricultural and religious organizations of farmers, who share the role of water management, have shaped the island’s landscape for almost a thousand years through the construction of rice terraces, and, subsequently, their ecosystems.

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\(^2\) The Green Revolution began in the laboratories of the International Rice Research Institute in the Philippines in the 1960s, and spread swiftly across Asia, gaining a firm foothold in Indonesia by the early 1970s (Lansing, 1995:75).
Rice cultivation demands huge amounts of water during the first stages of its cultivation. Traditional rice farming in Bali involves flooding large extensions of land coordinated in time, which allows for optimization of water sharing and control of pests such as rats. Water allocation among neighboring farming communities is organized through water temples. The synchronization of cropping patterns is a natural mechanism for pest control and it is considered one of the unique characteristics of the subaks in Bali (Lansing, 1995).

Balinese farmers believe that all water used for irrigating their rice fields comes from a crater lake located in the center of the island, situated near Mount Batur. The water is considered a gift from the Goddess of the Lake, Dewi Danu. In return for the water received from this goddess, each year the subaks contribute with one part of their harvest to their subak temple (Lansing, 1995).

All the rice fields that share the same water source and irrigation infrastructure define the subak boundaries. Subak members include all the farmers who grow rice within these boundaries regardless of whether they are landowners or sharecroppers; and, consequently, they share the same water source, or temple, and carry out yearly offerings to these same temples. Within the subak, meetings are held regularly and farmers’ attendance is compulsory. Among the most common topics discussed during these meetings are the cleaning and maintenance of the irrigation canals and the synchronization of cropping patterns. Another attribute of the subaks highlighted by Lansing (2006) is its democratic values and self-governing principle, despite the hierarchical organization of water temples. For example, during these subak meetings Balinese speak to each other freely without taking into consideration their caste. Finally, subak meetings “guarantee continuity and regular exchange among the neighboring farmers” (Lorenzen and Lorenzen, 2007).

Artha Wiguna et al. (2005) have described subaks as a physical, agricultural, social, religious, and legal unit, which constitute “one of the three public entities of a traditional Balinese village” (Geertz, 1980 and Sutawan, 2000 in Lorenzen and Lorenzen, 2007). “The other two [public entities of a traditional Balinese village]…are the hamlets (banjar) which are responsible for regulating community
life” (Lorenzen and Lorenzen, 2007:6) with the exception of agriculture “and the
temple congregation (pemaksan) which organizes and coordinates the…religious
ritual related to the customary village (desa adat)” (Lorenzen and Lorenzen, 2007:6).

**Subaks** are a religious and social community where “values such as cooperation,
solidarity, harmony and a strong sense for community are fundamental for a well
functioning irrigation system” (Artha Wiguna et al. 2005; Sutawan, 2000; and
Groenfeldt, 2003 in Lorenzen and Lorenzen 2007). **Subaks** are multifunctional in
terms of ecological functions: “the complex system of canals and weirs contributes to
flood control, groundwater recharge, flood prevention, and prevention of soil erosion

Though the **subak** is an institution that has existed for more than a thousand years,
today it is facing several threats as a result of tourism, land conversion, off-farm
authors argue that the **subak’s** importance in Balinese social organization is
decreasing given that farmers can no longer rely on each other for labor. In the past,
members often worked together on each other’s lands, heightening the sense of
community and collective work. Now, farmers must often pay for extra labor.
Workers are hired either from the same community (i.e. old women) or from the
neighboring island of Java (Lorenzen and Lorenzen, 2007). Therefore the **subak** can
no longer “benefit…from the previously strong links and solidarity between the
village and the rice field” (Lorenzen and Lorenzen, 2007).

Farmers no longer live primarily on the gains from their agriculture. Activities
external to farming are a real contribution to their income. While farming provides
them with a secure source of food in times of economic uncertainty, off-farm
activities could also be considered a source of security when the harvest is not
successful (Lorenzen and Lorenzen, 2007). As Lorenzen and Lorenzen (2007:2) have
pointed out, “the **subak** is no longer an association of mainly subsistence farmers…
[but rather] consists of farmers with different off-farm opportunities and different
incentives”.
3.1.1 Subaks in a larger governance setting

Bali is one province within Indonesia. The Governor of Bali province is both the chief executive of the province and a representative of the central government. Beneath the province level there are eight districts (kabupaten) which are further divided in subdistricts (kecamatan). Under these subdistricts is that we found the village or desa. Besides the official government at the village level (dinas), there is a customary or traditional government (adat). The spatial boundaries of the traditional village do not always coincide with the boundaries of the official village. (Mitchell, 1994)

The subak is one of the three public entities within a traditional Balinese village described earlier. Currently, the way in which the subaks are connected to a larger governance setting is through “offering services for assisting in the collection of tax from the farmers…[and disseminating] information of government development programs to the farmers (Sutawan, Interview ABC-TV). Local branches of the Department of Agriculture are spread through the entire island and interaction between the government and the farmers is through the extension officers (MacRae, et al., forthcoming).

3.2 Changes in Bali in the last four decades

Since 1960, Bali has reported an exponential growth in the tourism sector. In 1960, 5,000 tourists visited to the island per year (Lorenzen and Lorenzen, 2007). By 2007 this figure rose to 1.6 million people (Bali Province Statistics 2008). Despite Bali’s rapid economic development due to tourism (Artha Wiguna et al., 2005), the growth of this industry has had several social, economic and ecological consequences for the farming communities dependent on rice cultivation in rural areas of Bali. First, it has displaced agriculture as the leading sector of the gross domestic regional product (Picard, 2005:182). Second, it created new off-farm job opportunities for farmers (Lorenzen and Lorenzen, 2007). Third, the island has experienced a higher incidence of land conversion from rice fields to land for housing estates, roads and hotels. As a consequence of the former, water shortages have become recurrent and waste has increased throughout the island (Warren, 2008).
Besides tourism, another important change in Bali came with the introduction of new high-yielding varieties (HYV) of rice crops in the 1970s, which replaced native Balinese species. This period, known as the Green Revolution, incurred the replacement of native rice together with the introduction of the use of chemical fertilizers and pesticides. These new policies encouraged farmers to focus on the “continuous cropping of the new HYV rice in an effort to boost rice production. [Nevertheless]…immediate gains in rice yields…were offset by water shortages and…outbreaks of rice pests and diseases” (Lansing, 1995:75).

Recently, population growth, together with the construction of new roads, has displaced rice terraces and water channels. The former caused both land prices to rise and the conversion of rice fields to non-agricultural land (Lorenzen and Lorenzen, 2007). For example, land used for irrigated rice diminished from 85,128 ha. in 2000 (Lorenzen and Lorenzen, 2007) to 81,235 ha. in 2007 (BPS 2008, Area of land by Regency/Municipality, 2007). Lastly, Bali is currently undergoing an environmental crisis in which “the severe degradation of the environment…is rapidly eroding the island’s touristic appeal” (Nordholt, 2007; Picard, 2005:182).

To sum up, the social-ecological system in Bali is facing a challenge and a loss of resilience. Social capacity is being eroded due to the incidence of global drivers such as tourism and the market economy. These drivers coupled with a range of ecological stresses are changing not only the livelihoods but also the values within a traditional social structure in Bali such as the subak. Even though Balinese have been exposed to several crises in the past –for example, the Dutch colonization and the Japanese occupation in the 40s (Nordholt, 2007)— the scope and intensity of these global drivers represent an enormous threat to the survival of the subak and consequently the maintenance of the cultural landscape of Bali.
3.3 Subak Pulagan, Kumba and Kulub

The area studied comprises three subaks: Pulagan, Kumba and Kulub which are located in the District of Tampaksiring, Regency of Gianyar. The approximate area of wet rice (sawah) cultivation for the three subaks is 103 hectares for Pulagan, 95 hectares for Kumba and 40 hectares for Kulub. Subak membership in Pulagan is 215 farmers, 195 in Kumba (Sutawan et al. 1990 in Schoenfelder thesis, 2003) and 108 in Kulub. Some of the farmers are landowners while others are sharecroppers however this does not affect their association with the subak.

The source of irrigation water for Pulagan and Kumba is the spring at Tirtha Empul, while subak Kulub receives its water from the spring at Mengening. Tirtha Empul is considered one of Bali’s holiest springs. Visitors in the area of Tampaksiring, which includes two of the most visited sites within this region –Pura Tirtha Empul and Gunung Kawi Rock Cut Temple– have totaled more than 63,000 domestic visitors and 60,000 foreign visitors during 2004. (Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009)

Figure 2. Map of Gianyar in Bali, Indonesia

Source: http://upload.wikimedia.org/wikipedia/commons/c/c6/Location_Gianyar_Regency.png
The main cultivation in the area is high-yielding varieties of rice, which were introduced with the Green Revolution (Lansing, 1995). However, native species are still grown and used for religious ceremonies. Rice is harvested in the area at least twice per year. Other crops such as coconuts, flowers, chili, peanuts, and sweet potato are also grown as side crops. According to the farmers from the region, enough rice is cultivated for both consumption and religious purposes. In the recent years it has become common to plough the land using tractors. The tractor is either owned by the
subak or they must rent one for the farmers to use. Chemical fertilizer and pesticides are commonly used as well as cow manure.

Additional sources of income in this area come from activities such as carving, raising cattle, carpentry, etc. Farmers’ incomes no longer rely solely on agriculture. For example, many of the sons and daughters of the farmers interviewed have non-farming jobs, either in the tourist sector or as government officials.

3.4 Historical background for UNESCO nomination. An overview of the World Heritage Site nomination

Communities, societies and ecosystems are connected to global processes that make them vulnerable to pressures and incentives generated in other social and political levels. Bali, as a case study, can serve to understand and to exemplify how these global processes of change are affecting traditional societies and communities (Schmuki thesis, 2009). The diversity of preferences regarding the trajectory that the social-ecological system could follow in Tampaksiring are directly influenced by these global processes. The extent to which these processes are influencing traditional governance structures together with social values in Bali is huge. For this reason, Bali is a relevant case study to analyze how diversity of preferences for the future can influence adaptive co-management.

The idea of nominating some sites in Bali as a World Heritage Site was proposed in response to challenges posed by environmental and social changes going on in Bali (see section 3.1 and 3.2) as a consequence of global drivers. This nomination aimed to protect the culture and identity of Bali, including the subak. The process was initiated in 2002 by the Directorate General of Culture; later other governmental agencies joined the nomination.

On January 18th, 2007, the Indonesian government presented to UNESCO its Tentative List that included several clusters of temples and rice fields located in Bali.
intended to become a World Heritage site\textsuperscript{3}. This inscription under the name of “Cultural Landscape of Bali Province” was the first official step towards becoming a World Heritage site.\textsuperscript{4} On July 2007, a nomination proposal and a Management Plan were submitted to UNESCO.

On July, 2008, the World Heritage Committee deferred the evaluation of the nomination of Cultural Landscape of Bali Province because it didn’t include the importance of the ecological systems surrounding the temples. They recommended the State Party “reconsider the choice of sites” and focus more on the subak’s system of water management to show the “close link between rice terraces, water temples, villages and forest catchment areas…where the traditional subak system is still functioning in its entirety and managed by local communities” (WHC-08/32.COM/24, 2008:165). Finally they suggested putting in place a “management system that aims to sustain traditional practices and deflect inappropriate development or the impacts of development” (WHC-08/32.COM/24, 2008:165). Hence, UNESCO required that the Balinese government submit a nomination that increased the focus not only on the temples but also on the surrounding environment.

After the UNESCO deferral of this nomination in 2008, the Indonesian government submitted a new nomination dossier in February 2009. This new dossier included areas that clearly reflected the water management linked to the rice terraces. It stated intentions to develop a management plan based on the principles of adaptive co-management in efforts to secure stakeholder involvement in the management of the area and of the complex social-ecological landscape in Bali (Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009). The nomination

\textsuperscript{3} The nomination included eight archeological temples along a corridor of the Pakerisan and Petanu rivers in south-east Bali, among them Tirtha Empul, Gunung Kawi rock temple and Pura Mengening; Taman Ayun, one of Bali’s most important temple complexes, and some rice fields in the center of the island (Cultural Landscape of Bali Province, http://whc.unesco.org/en/tentativelists/5100/).

\textsuperscript{4} The Tentative List consists mainly of an inventory of sites within the country’s borders that State Parties of the World Heritage Convention could possibly “submit for inscription in the following five to ten years” (World Heritage List Nominations, http://whc.unesco.org/en/nominations/). Once the property has been registered in the Tentative List, the State Party is able to file a nomination dossier before UNESCO. Following, the World Heritage Centre reviews the file and if complete it is sent for evaluation to the Advisory Bodies, which are: the International Council on Monuments and Sites (ICOMOS) and the World Conservation Union (IUCN). After the assessment, the intergovernmental World Heritage Committee makes a final decision regarding the nomination (World Heritage List Nominations, http://whc.unesco.org/en/nominations/)
included not only the temples that provide the farmers with irrigation water but also the rice fields, on which farmers’ livelihoods directly depend.

Consequently, several subaks were integrated into the new nomination. One example of this addition of new subaks was the cluster formed by three temples within the Tampaksiring region. The dossier from 2007 included 1) Pura Tirtha Empul, 2) Pura Mengening, and 3) the Royal Tombs of Gunung Kawi. The revised nomination added three subaks: Pulagan, Kumba and Kulub and an extra temple: 4) Gunung Kawi Monastic Retreats to create a cluster under the heading of: The Ancient Water Temples and Subaks of Tampaksiring.

During the socialization process for the 2007 nomination, when the public was informed of the situation with UNESCO, farmers within subaks Pulagan, Kumba and Kulub were notified about the possibility that these temples could become World Heritage sites. Farmers were informed of this nomination because the water used for irrigating their rice terraces comes from springs located inside these temples. However, this first nomination did not include any of the farmers’ fields. At the time this fieldwork was completed, the government was going to begin communicating to the farmers in these subaks its intentions to include their lands in the nomination process and the heritage sites.

Figure 4. Map showing five clusters of sites new nomination 2009

Source: Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009
4. Methods

Fieldwork was conducted in Bali, Indonesia, for eleven weeks from the end of September to the beginning of December 2008. The research was carried out in four stages: 1) literature review, in order to gather background information on the social and economic organization of Balinese society 2) visits to the study area of Tampaksiring 3) open-ended semi-structured interviews with farmers and other community members for data collection and 4) outlining potential scenarios for the future.

4.1 Case study selection

The study is limited to three subaks in the village of Tampaksiring in Bali, Indonesia. Out of five clusters of sites, I focus on cluster B, the “Ancient Water Temples and subaks of Tampaksiring” (See figure above). The motivation for choosing this particular site was its geographical size and accessibility. Compared to others areas, also part of the nomination process, the area chosen was the smallest geographically. Due to the size of the site, I was able to conduct my research and data collection, as well as form a first-hand impression of how the temples and the rice fields were connected, within a three month time period. The latter would have been almost impossible at other sites. Also, Steve Lansing, a researcher expert in Bali asked to assist with the preparation and writing of the new dossier for UNESCO, referred me to Ida Bagus Suryawan, a local researcher living in a city near Tampaksiring. Ida Bagus Suryawan was willing to act as my one of my translators; therefore, I decided to focus on the Tampaksiring site because of his familiarity with the area. However, since definition usually implies exclusion, limiting the area of study was a difficult, though necessary task. One of the downfalls of using only the Tampaksiring site is that it excluded other areas up for nomination as well as the farmers, their practices and preferences. Yet, this delineation and bounding of my subject site also allowed for a more in-depth study of the Tampaksiring area and its inhabitants.
4.2 Data collection

4.2.1 Context information

General information about Bali was easily found in scholarly articles and books. More specific information about the *subak* system in Bali was also accessible through contact with specialized researchers. However, specific information of the case study area, particularly statistics on rice harvests per year, use of chemical fertilizers, utilization of tractors, other crops grown in the area, additional income sources, family’s income composition, etc. was not mentioned in the existing literature. Interviews with farmers and other relevant actors were useful in providing this missing contextual information.

4.2.2 Qualitative interviews

The choice of qualitative methods was motivated by the aim of the research, which was to investigate the diversity of preferences for the future in the *subaks* in Tampaksiring and to explore these results. Quantitative methods, such as conducting surveys, together with statistical results, would have been useful in showing overall trends within the society. For example, examining how many people share one collective vision or hopes for the future of their families, land, etc. However, they would have been limiting, in showing more details of this diversity.

Open-ended semi-structured interviews (Kvale, 1999) were carried out in the three *subaks* mentioned previously. Seventeen interviews were done with farmers, and five with the children of the farmers. Two women from these communities were also interviewed.

In addition to these, I conducted two additional interviews, one with an academic and one with a local tourist operator. These interviews were carried out to get a better feel for the socio-political and economic context of the area and its relation to the UNESCO nomination.
In the first stage of the research, interviewees were selected using a convenience sample strategy (Marshall, 1996). This involved identifying farmers who were active in the field in subak Pulagan, Kumba and Kulub. Additionally, five youngsters, children of the farmers were interviewed in order to gain more insight about their desires for the future. These young adults were contacted through a local tourist entrepreneur who operates organized tours on several areas of farming land.

One of the most well acknowledged drawbacks of convenience sampling strategy is that the samples are not representative, therefore researchers cannot make generalizations about the population at large. When using this type of sample, a researcher must focus on whether or not the research question can be answered adequately by using a convenience sample (Marshall, 1996). The sample in this thesis never intended to be representative of the whole community; rather, the point was to distinguish if there was any kind of diversity of preferences of future social-ecological development apparent within the sample. I found this type of sampling to be adequate considering the fact that my goal was not to make generalizations based on the representative sample sizes. My aim was to explore whether or not there was diversity, in regards to their hopes for the future, among these individuals.
The convenience sampling was a useful approach in the first stage of research to show that there was diversity of preferences. The limitation of such a method is that it does not allow for the researcher to select the interviewees. In a sense, it would have been very interesting to directly choose those to be interviewed rather than through random selection; however, I wanted to be as objective as possible in my selection of interviewees. In the second stage of research, after collecting more specific contextual information about the area, I was interested to know: what were the preferences of the farmers’ children for their land, and the area in general, in the future? As I could not find age-specific data about the subak population of Tampaksiring in the census information, I wanted to include individuals of varying ages in my interviews. While the farmers of one generation may have specific ideas about their wishes for the future of the land, the younger generation may not hold the same values.

The interviews intended to find out farmers’ preferences about the future of the area as well as their livelihoods in farming. Questions were based on scenario techniques tailored to conservation and adaptive co-management in community forests (Peterson et al. 2003, Wollenberg et al., 2000b). They were designed to later extract from the conversations those factors that the farmers “felt were critical determinants of the… [area’s] future” (Carpenter et al. 2006). As reported in other scenario exercises, thinking about the future may turn out to be problematic or difficult for communities (Wollenberg et al. 2000b, Evans et al. 2006) since change is not accepted as inherent to the social-ecological systems in which people live (Carpenter et al. 2006). Therefore the interviews followed some authors’ recommendation that propose first talking about the past, to realize that change is natural in all systems, and to further talk about possible changes in the future (Carpenter et al. 2006).

Following these recommendations, interviews commenced by asking farmers about the most important changes they had noticed since they were children and whether or not they were expecting continued change in the future. After having reflected on their pasts, the interviews were guided by the following questions, which served as an outline to steer a conversation about the interviewees’ future:
Figure 5. Outline guide for conversation with interviewees

- How could the area in which you live change in the future? And what could those changes be?
- What would you like to see remain the same about your current life and the area in which you live?
- What would like to see changed about your current life and the area in which you live?
- What do you think will be your grandchildren’s occupation?

\(^a\)^b Extracted from Wollenberg et al. 2000b

Interviews were carried out mainly in Balinese, and some of them were done in English. An interpreter translated the interviews and later another Balinese-English translator transcribed them. The transcription was done together with the translator. The former allowed for a better understanding of the cultural, political and religious life in Bali as both the translator and transcriber presented a great deal of context information for the answers I received during the interviews. All interviews were either video filmed or electronically recorded.

4.3 Data Analysis

The aim of this thesis was to build local qualitative scenarios based on interviews with farmers. These scenarios are not participatory; rather they were built from the interviews I conducted with farmers in the community.

4.3.1 What is a scenario?

A scenario is a story of a plausible future (Peterson et al., 2003) informed by existing conditions and processes (Enfors et al., 2008). Scenarios are not intended to predict the future but rather to explore different alternative futures in order to “identify opportunities and threats… [and therefore] navigate social-ecological systems along more desirable trajectories” (Peterson et al., 2003 in Enfors et al., 2008).
Scenarios take into consideration the forces that are driving a system while including uncertainties (Evans et al., 2006, Enfors et al. 2008). They differ from projections, which forecast the future based on current trends and do not take into consideration uncertainties. Scenarios also differ from visioning, which mainly focus on idealizing a single future.

Scenarios can be conducted in very different ways (Enfors et al., 2008). Its methods of construction and analyses go from quantitative to qualitative techniques including interviews (Wollenberg et al., 2000b). They can range from local to global scales (Enfors et al., 2008) and involve stakeholders passively or actively (Wollenberg et al., 2000b).

### 4.3.2 Scenarios methodology

Several steps were involved in the construction of scenarios 1) driving forces were identified both from literature and in interviews, 2) scenarios were created by combining these driving forces, 3) three coherent stories about the future were built based on the combination of these driving forces using interviews and relevant literature from the case study. The figure below shows the steps followed to analyze the data collected in the interviews and later build the scenarios based on this information.

**Figure 6. Scenario steps**

Adapted from Enfors et al., 2008

Driving forces are defined as “key factors or changes that could impact a community” (Evans et al. 2006:39). Some examples of driving forces are “new government policies, environmental changes, ethnic conflicts, market price shifts, health problems, roads, etc.” (Evans et al. 2006:39)
All the transcriptions of the interviews were analyzed searching for drivers of change i.e. factors that farmers mentioned were changing either their livelihoods or the landscape. The following list of questions guided this analysis:

**Figure 7. Analysis guide**

- What are important changes happening in the community? What is causing those changes?
- What things stay the same in the community and what keeps them stable?
- What has been happening to the environment (forest, streams, rivers, animals)? What is causing these changes?
- How are natural resources being used in the community? Do farmers expect them to change?
- How is the farming? Has it been changing?
- What is the government doing that is impacting the village? How does the village interact with the government?
- How do most people make a living? Are they expecting it to change? How?
- How do they think their children will be different from them? Why?
- What are some concerns or problems that they have or that they foresee?

Extracted from Evans et al. 2006:44

With this information, a general list of drivers of change was prepared (See Annex 1). Next, this list was edited by grouping the drivers by topic (Enfors et al., 2008). After grouping drivers, a total of seventeen drivers of change were identified. These drivers, were later compared to the information found in literature. Drivers were classified as *certain* if their development was considered unambiguous by both the interviewees and the literature. On the other hand, if farmers and/or literature disagreed about its development or if their scale and scope was unknown they were categorized as *uncertain* (Enfors et al., 2008, Evans et al., 2006). (See Annex 2)

From this edited list, three driving forces were chosen to create different and coherent scenarios about the future of the area. I focused on the driving forces –varying them in each scenario– and their role in potential futures for Tampaksiring. The following table shows how these forces were combined in the creation of the scenarios:
Table 2. Combination of driving forces for scenarios

<table>
<thead>
<tr>
<th>Scenario 1</th>
<th>Farming +++</th>
<th>Tourism +</th>
<th>Government +++</th>
</tr>
</thead>
<tbody>
<tr>
<td>Scenario 2</td>
<td>Farming ++</td>
<td>Tourism ++</td>
<td>Government ++</td>
</tr>
<tr>
<td>Scenario 3</td>
<td>Farming +</td>
<td>Tourism +++</td>
<td>Government +</td>
</tr>
</tbody>
</table>

4.3.3 Reflection on methods. Why scenarios?

Scenarios were useful in illustrating how changes in interactions between the social and the ecological systems have evolved in the past. They were also able to elaborate how these interactions might behave in the future. They shed light on “understanding drivers of change, the probabilities of future events” (Wollenberg et al. 2000a:5) and the diversity of preferences for the future of a group of farmers.

Moreover the scenarios developed were beneficial for understanding the interaction between the diversity of preferences within a local community and adaptive co-management. Not having the scenarios would only have showed that there was diversity of preferences for the future within a community but would have been limited in answering the question of how this could affect adaptive co-management. The scenarios were thought as a way to show how diversity of preferences could interact with other social and environmental processes occurring at different levels and therefore explore if this diversity could affect the process of adaptive co-management and how.

The fact that the scenario building was not participatory was a limiting factor in the process. Rather, the information in these scenarios was drawn from the interviews conducted with the farmers. My own qualms about interfering with the government’s socialization plan for these nomination sites (i.e., the government would later inform the people about the second nomination), were conditions of my methodology which also limited the breadth of the scenarios.
5. Results

Through the research and interviews conducted during the period of my stay in Bali, I found that farmers in Tampaksiring had different preferences for their own futures as well as that of their lands. Some farmers would like to keep the area in the same conditions as it is today and don’t imagine the area could suffer any change in the future.

“I would like the area to remain the same for my grandchildren but it depends on the government” (Farmer DPT, subak Kumba)

“My family doesn’t own any sawah however I don’t want the area to change in the future. I don’t imagine myself in other place in 20 years [from now]. I wouldn’t like to see hotels or villas in the sawah” (Son of farmer, DGT, subak Kumba)

“My father still works now in the land we own. I don’t want the surrounding change like in Ubud. I love the nature, so I would like to see the situation now remains the same in the future…In 20 years from now the farming will be continued, the environment will still be natural. I think that no change is going to be seen in the area near my sawah. In other words, I don’t want the environment to change like in Ubud.” (Son of farmer, S, subak Kumba)

“I never think that the situation will be changed because all lands here are inherited by the parents and we believe it is our obligation to keep maintaining the inherited land. I like the nature…In 20 years from now there will be no change. I want everything I see today will just be the same in the future. I can still see the beauty of the nature I love.” (Farmer WJ, subak Kumba)

“I don’t want to see my sawah changed. I want “tileh uma” (tileh=still the same, uma=sawah). I don’t want to sell the land because I know that the money I get when the land is sold cannot be saved in relatively long time. I realize that owning the sawah is more important than having much money, which is just for a short time. I don’t want to lose my sawah. The crops from the land can support my life forever but the money that comes from land selling will only remain one year” (Son of farmer, KD, subak Pulagan)

“Q. How do you imagine your subak will look in 20 years?
A. The subak of course cannot be changed but people don’t want to go to the rice fields to work as farmers, for example my son. In my heart I really like the subak to be as it is today but I see my son doesn’t want to work in the rice field and maybe my grandchildren will not be farmers

Q. What could happen to your subak if your son doesn’t want to go to the rice field?
A. Although he doesn’t want maybe he will go to the rice field because there will be no other person or he will try to maintain the sawah by whatever means. My son has understood that the sawah will be inherited to him, and he knows that it comes from his ancestors so he will not try to sell it…My son tells me: Father you are still strong to do the farming so let us find another job, whenever you are not able to work in the rice fields we will do it. Who else will?” (Farmer INM, subak Pulagan)

“Luungan banggiang (Balinese expression that means ‘it is better to keep it the same’)” (Son of farmer, S, subak Kulub)

However, there were also some differing opinions as to the best alternatives for developing the area and improving their livelihoods.

“I hope my sons are able to manage the land productively. They have to find ways to market their crops since farming means nothing if the crops they yield cannot be marketed. The government must be able to give the farmers a hand in order to make them professional farmers. Most importantly, the government should encourage the farmers and show them ways to sell their crops...I expect that one day my sons are able to continue working [the] land with more creativity. It means that they know how to develop an effective farming with business oriented. The sons must be creative to manage their farming in which the harvest can be used for family’s consumption and also to make money” (Interview Farmer DKD, subak Kumba).

“Most of the people hope for change in Tampaksiring so it can be like Ubud. If the regent was still the previous maybe it would be different and Tampaksiring would look like Ubud. Before the election the people were ready to sell the land but that could only have happened if the previous regent was reelected. In other areas like Sembuh and Melayang people can sell their land including my sister. Whenever I know that there is land that will be sold I also help to find buyers.” (Farmer GR, subak Kumba)

“I’m not afraid of the consequences of tourism. I see people in Gunung Kawi; tourism already exists in the area.

Q. Do you think that tourism could decline, for example if there is a bomb like in 2002?
A. There will be no bomb because of the Governor.

Q. What do you think could be some of the consequences of tourism for the area? What about the sawah if tourist infrastructure is built here?

A. I’m not worried if there’s no sawah left because the area has become tourism object. This means that the income is higher. There’s a chance to develop the area because the surroundings have become tourism objects and there are more tourism objects that in Ubud.” (Farmer GR, subak Kumba)

“Q. What would you do if you were offered to work as a hotel staff? Would you choose staying as a farmer or work at the hotel?

A. [If I was offered to work as hotel staff] I would leave the life as a farmer and start the job in the hotel industry. I’m bored of being a farmer…As economy demands increase, I need to make more money to support the family and fulfill the daily needs. In the past when the economy situation was not like today, to live as a farmer was very easy and relax. When I was a child, I often spend my time in the rice field, the farmers had much time to get relax, talked to each other and took care of their roosters” (Farmer N, subak Kulub)

In this sense, diversity exists among the farmers, regarding their individual and collective aspirations for their future and their localities.

5.1 Drivers of change

Seventeen drivers of change, deduced from the analysis of the interviews, were identified. Of these, seven were defined as uncertain: 1) water volume, 2) water quality, 3) tourism, 4) regulations for selling land, 5) farming, 6) farmers’ children becoming farmers and 7) government. In summation, there are several social, economic and environmental processes going on in Balinese communities, the outcomes of which are uncertain. (See Annex 1, Annex 2)

These drivers were defined as uncertain either because of discrepancies in the farmers’ opinions about the future development of these factors or due to the conflict between the information gained from interviews and the data recorded in the literature (Enfors et al 2008). Three drivers were selected to build the scenarios. These were tourism, government and farming. Other drivers such as water volume, water quality and regulations for selling land, even though defined as uncertain, were not used as
the main drivers in the scenario building. The reason why these drivers were not used is because they are different in each subak. For example, there is no regulation for selling land that is applicable to the three subaks instead each one has a specific regulation. In the same way, farmers rely on different waters sources. Therefore, the results on one subak cannot be generalized to the others. Even though they were not used to define the main scenario trajectories they were incorporated into the scenarios.

Table 3. Drivers of change

<table>
<thead>
<tr>
<th>Drivers of change</th>
<th>Certain</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Construction of new roads</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>2 Modernization of agriculture</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>3 Loss of soil fertility</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>4 Water volume</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>5 Water quality</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>6 Housing in the sawah(^5)</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>7 Tourism</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>8 Regulations for selling land</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>9 Development in the dryland</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>10 Introduction of new plants/crops</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>11 Farming is stable/not stable</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>12 Changing interest in farming in younger generations</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>13 Better off-farm working conditions</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>14 Low income as a farmer</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>15 Increased cost of living</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>16 Farmer’s children becoming farmers</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>17 Government</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

5.1.1 Tourism

Tourism was identified as an uncertain driving force. Some farmers think that tourism might increase no matter what occurs within Bali or globally. Based on this assumption, some of the farmers would like to develop the area as a touristic site. The latter implies selling their land, building hotels and other type of accommodation even if this means the cessation of rice farming.

\(^5\) The term sawah refers to the rice field, the wetland.
“I’m not afraid of the consequences of tourism. I see people in Gunung Kawi; tourism already exists in the area.

Q. Do you think that tourism could decline, for example if there is a bomb like in 2002?
A. There will be no bomb because of the Governor.

Q. What do you think could be some of the consequences of tourism for the area? What about the sawah if tourist infrastructure is built here?
A. I’m not worried if there’s no sawah left because the area has become tourism object. This means that the income is higher. There’s a chance to develop the area because the surroundings have become tourism objects and there are more tourism objects that in Ubud.” (Farmer GR, subak Kumba)

Others are doubtful about the development of the area for tourism. They are convinced that the area will not survive if hotels and restaurants are established in the region.

“Tourism is not stable. On one side the income from tourist industry is very promising, however on the other side it really depends on the visit of tourists. If the land is changed into tourist facilities such as hotels, restaurants or villas it will not survive” (Farmer DKD, subak Kumba)

Finally, others believe that the maintenance of the area’s natural landscape and keeping the status quo will lead to increased tourism. In this way they are willing to keep or maintain the area, holding the same conditions environmentally and socially which exist today i.e. not succumbing to tourism’s infrastructure.

“If the area is as natural as today it will benefit the area because tourists like to see the nature, that’s why they come…but if there are many stores and shops the nature will be changed” (Farmer IMD, subak Pulagan)

5.1.2 Farming

Farming is also an uncertain driving force that emerged after analyzing the interviews and social and economic literature in Bali. Among the farmers from the three communities interviewed in this study, no consensus can be established as to whether
or not farming is stable in the area. Some consider it stable because farming provides them with staple foods.

“Most of the farmers could not work fully for their land because they also have to think of supporting their life instead of rice farming. It doesn’t mean that they are going to leave their land as they know that life as a farmer is safe. Despite the low income they can still depend on the harvest of their rice fields for consumption” (Farmer DKD, subak Kumba)

“I don’t want to see my sawah changed. I want “tileh uma” (tileh=still the same, uma=sawah). I don’t want to sell the land because I know that the money I get when the land is sold cannot be saved in relatively long time. I realize that owning the sawah is more important than having much money, which is just for a short time. I don’t want to lose my sawah. The crops from the land can support my life forever but the money that comes from land selling will only remain one year” (Son of farmer, KD, subak Pulagan)

“The government must pay attention to the life of farmers, especially in Pulagan. The land is only 275 hectare. So this area is considered a small farming land. If the people decide to sell the land, what will happen? They are not able to provide their staple food for consumption anymore.” (Farmer DKD, subak Kumba)

Others think the opposite: farming is not stable.

“I want my grandchildren to have a better life, not as a farmer, escape from this condition because being a farmer is not a stable income, I would like my grandchildren to earn a stable income.” (Farmer DMS, subak Kumba)

Moreover having a job external to farming allows the farmers a supplemental income.

“In the past, being a farmer could be a main job, but now since the economy demands grow significantly, farmers need to support their family’s life by trying to get additional income from many other activities like carving and raising cattle.” (Farmer DKD, subak Kumba)
5.1.3 Government

Finally, the government could play a very different role in influencing the future development of the area. Based on the interviews, it is also an uncertain driving force. For example, the government is perceived as a driver of change regarding the development of tourism, as they make the final decisions for example, about the construction of new hotels.

“If the previous Bupati (regent) had been reelected it would have been possible to build a hotel. It is more difficult now because the Bupati is from Ubud⁶. There’s one hotel built near Tampaksiring Palace (the presidential house) but it has been destroyed because the hotel was built in a green area. The hotel that was destroyed is in Tirta. The compensation was given because of the destruction… Most of the people hope for change in Tampaksiring so it can be like Ubud⁷. If the regent was still the previous maybe it would be different and Tampaksiring would look like Ubud. Before the election the people were ready to sell the land but that could only have happened if the previous regent was reelected. In other areas like Sembuh and Melayang people can sell their land including my sister. Whenever I know that there is land that will be sold I also help to find buyers.” (Farmer GR, subak Kumba)

The government might also have a significant role in the agricultural sector, as well, and is therefore considered a substantial driver of change. For example, by implementing policies that could increase yields and give farmers access to markets.

“I hope my sons are able to manage the land productively. They have to find ways to market their crops since farming means nothing if the crops they yield cannot be marketed. The government must be able to give the farmers a hand in order to make them professional farmers. Most importantly, the government should encourage the farmers and show them ways to sell their crops” (Interview Farmer DKD, subak Kumba).

The government could also play a fundamental role in conservation of the area by promoting measures that encourage people to keep their land and enforcing strong

⁶ Cok Ace is the new Bupati (regent) in Gianyar Regency. He studied Cultural Studies at Udayana University. It is assumed that he has a different concept of tourism (Note from transcriber)
⁷ Ubud is a town in Gianyar regency. It was intended to become the cultural center of the island. Now it is overrun by tourism development and a lot of the rice paddies are lost.
regulations aimed to stopping farmers from selling their land or changing the land use.

“I hope the subak remains the same, therefore the government should encourage people to maintain their land...I don’t want to see changes in 20 years because Bali will not be Bali anymore without subak. Thus, I hope it doesn’t change. I suggest the government to apply a strong regulation concerning the land selling. The regulation must be strong. The government should think of the future if they don’t act right now. A strong regulation should be applied to prohibit people to change the function of the land or to sell it...As a pekaseh...I really hope that the government makes a strong regulation since the customary law is not quite strong to forbid people selling the land. There were cases of selling land but I didn’t know the process. No one told me. I suddenly found the land had been sold without a confirmation before [from me, the pekaseh]. I wasn’t informed before the land [was] sold. All of a sudden, there were notary’s documents [that] showed that the land had been sold.” (Interview Pekaseh MP, subak Kulub)

“If the government has a plan to change the land, the zoning must be good. There must be a balance percentage for the use of the land, some parts are for the government project and some parts are kept for the agriculture. Most importantly, some parts of the area must be kept for green area: agriculture and nature. So, people can still see the nature and sawah as what they see today. I don’t want to see the land changes like in Ubud.” (Son of farmer, S, subak Kulub)
6. Scenarios

The following scenarios represent the combination of three main driving forces in the area of Tampaksiring: tourism, government and farming. Farmers’ ideas about the future and information found in literature were incorporated into these scenarios.

6.1 Scenario 1. Expanding agriculture

The area becomes a World Heritage Site (WHS), however after ten years of being a WHS tourism has not developed to the extent that actors at various levels had hoped and some farmers feel disappointed about it. Due to urbanization processes in Asia, combined with increase in population, the continent’s demand for rice increases (Papademetriou, 2000). Since 2008, Indonesia has reported a surplus in rice production. Due to this surplus, the national government had lifted the ban on rice exports (Azly, January 10, 2009). As Bali is still an agricultural land, the government sees an opportunity to expand agriculture and business through export (MacRae, 2005). Some of the farmers from the WHS in Tampaksiring are eager about participating in this new economic growth. Farmers would like to become integrated with the market economy. However, the rice grown in Tampaksiring is enough only for self-consumption.

“I expect that one day my sons are able to continue working [the] land with more creativity. It means that they know how to develop an effective farming with business oriented. The sons must be creative to manage their farming in which the harvest can be used for family’s consumption and also to make money” (Interview Farmer DKD, subak Kumba).

As the economy continues to change in other areas of Bali, tension and conflict plague the area. There is disagreement among the farmers regarding which development trajectory was the best alternative for the area, and its inhabitants. As it has happened before in other areas in Bali: “potential conflicts presented by different patterns of resource use and different development options” (Warren, 2008). Some doubt the decision to become a WHS since they can no longer be integrated in the new and growing market economy. This opens a window of opportunity and several
key innovators from governmental agencies and NGOs propose an export system based on the existing values of the WH requirements and subak infrastructure. As organic rice products are successfully marketed globally, particularly in North America and Europe, they believe the export of organic rice grown on the WHS subaks will be a highly marketable crop (MacRae and IWA Artha Wiguna, forthcoming).

The government drives a learning process for the farmers in the WH subaks, initiating community meetings with the local farmers, environmentalists and some officials with knowledge in farming practices (MacRae and IWA Artha Wiguna, forthcoming). The government plays an important role in training farmers. For example, they receive some education in how to sell their crops and search for viable markets.

“I hope my sons are able to manage the land productively. They have to find ways to market their crops since farming means nothing if the crops they yield cannot be marketed. The government must be able to give the farmers a hand in order to make them professional farmers. Most importantly, the government should encourage the farmers and show them ways to sell their crops” (Interview Farmer DKD, subak Kumba).

The cumulative effect of many years of agrochemical use has damaged the land. Nevertheless, both the rice fields and the water quality are slowly recovering from the effects of over-use of pesticides and chemical fertilizers.

“I still use chemical fertilizer but I realize [that] the condition of the soil will be better if the organic fertilizer is used. The change in the soil quality is because of the fertilizer. The quantity of harvest is the same whether using organic or chemical fertilizer. I have two cows whose manure is used as fertilizer. If the farmers [had] cows they might use the cow manure as fertilizer but...most of the farmers prefer chemical fertilizer.” Interview Farmer MR, subak Kumba

Farmers, government and NGOs go through a period of learning. Social trust is enhanced, furthering the development of social capital among the farmers and other stakeholders. Vertical cooperation between the government and NGOs engaged the people in a process of creating sustainable business farming practices. (MacRae and IWA Artha Wiguna, forthcoming)
The economy develops and grows; however farmers become more vulnerable to price fluctuations. Also, young people who are not interested in farming have begun migrating to other cities in search of work (MacRae and IWA Artha Wiguna, forthcoming). The main economic activity is agriculture and younger generations are more interested in other jobs besides farming.

6.2 Scenario 2. Cultural tourism

Ten years have passed since the area was designated a World Heritage Site. Before the nomination some farmers had several different ideas about the future trajectory of the area that were not compatible with the nomination. Some wanted a transition to more market oriented and intensive agriculture while others wished to sell their land for tourism development. However after several subak meetings together with the government they have arrived to a common interest and decide to go on with the nomination. Subak meetings allowed a space for negotiation (Artha Wiguna et al., 2005). This was not easy but rather required a lot of negotiation and commitment (Warren, 2005). Since then, the area has undergone several changes, in response to the nomination, in an attempt to attract many tourists. Some of these changes include the end of tractor use; now farmers only use cows. Also, farmers have discontinued using chemical fertilizers and pesticides in the subaks following the management plan recommendations to change to organic agriculture. Instead they use cow manure.

Q. What would you like to see changed about the area in which you live? What would you like to see in the future? A. “Nowadays, I use organic fertilizer mixed with chemical fertilizer...In the future, I would like to see more cows in the field, in all the places where I have sawah in order to use their manure” (Interview Farmer S, subak Pulagan)

These changes made farming more labor intensive (MacRae and IWA Artha Wiguna, forthcoming). Physically farmers need to work harder than before the nomination. Chemical fertilizers were easier to handle and transport, while plowing with the tractor gave them more spare time.
Despite the increase in labor, cooperation among farmers has increased due to a feeling of solidarity generated by the World Heritage nomination. The farmers are working together with the principle of mutual understanding or Gotong Royong as they used to do in the past. Cooperation among subak members has increased social capital. Subak becomes stronger.

Q. How has the subak changed in the past years? A. “The subak has a tractor, before having a tractor the farmers worked together with the principle of mutual understanding or Gotong Royong, specially in the plantation” (Interview Farmer KR, subak Kulub)

Tourism has increased in response to UNESCO’s nomination.

If the area is as natural as today it will benefit the area because tourists like to see the nature, that’s why they come. But if there are many stores and shops the nature will be changed” (Interview Farmer IMD, subak Pulagan).

People interested in traditional rice farming visit the area.

“I expect many tourists [will] come to see the World Heritage, this means that the economy of the people can be improved because they can get more income, for example they can sell something and the products can be bought because many tourists come” Farmer KR, subak Kulub).

The main economic activity is subsistence rice farming complemented by cultural tourism. Though tourism grows rapidly in the area, farmers still grow rice as a staple food, which is also useful in times of economic instability. In times of unfavorable agricultural or climatic conditions they can earn some income from tourism (Lorenzen and Lorenzen, 2007). Younger people, and other farmers who are not interested in farming, have found some job opportunities in the tourist industry in the area.

“All the benefits from World Heritage is that it will be easier for young generations to work as a guide for tourists who come to see the area. So the life can be changed but not the landscape” (Interview Farmer KR, subak Kulub).

The three subaks studied in this thesis subak Pulagan, Kumba and Kulub are known for practicing traditional rice farming. (Draft World Heritage nomination of the Cultural Landscape of Bali Province 2009 II-42)
The nomination has ensured the protection of the land, to prevent it from being used for purposes other than farming.

“I think the nomination can protect the farmers for example if someone wants to do something different than farming in the sawah like a chicken house they will not get a permission” (Interview Farmer KR, subak Kulub).

6.3 Scenario 3. Tourism oriented

The area has been nominated as a World Heritage Site. In the first years after the nomination, the surroundings have attracted tourism developers from throughout Indonesia. The government has not been able to safeguard the environment –as it has happened before in other areas of Bali, for example in Tanah Lot (Warren, 1998).

“There’s a chance to develop the area because the surroundings have become tourism objects and there are more tourists objects than in Ubud” (Interview Farmer GR, subak Kumba)

Farmers within the neighboring areas that were not benefited by the tax incentives given to the farmers within the WHS areas (Draft World Heritage nomination of the Cultural Landscape of Bali Province, 2009) had begun selling their land.

“Q. If you could think about the area would it look in 20 years from now? A. I can’t imagine exact things; maybe it will be different because people will sell land because they need money. Some people from Ubud were asking if the land can be sold but no one has sold until now at least in this subak. I understand that the situation in Ubud began with one person selling his land and then followed by other land owners” (Interview Farmer INM, subak Pulagan).

Hotels, villas and new businesses are beginning to be built in the surroundings. These hotels are allowing a massive and uncontrolled flow of tourism. Suddenly almost all the sawah has been sold and there are few places left to grow rice (Warren, 1998).
“I don’t worry even if there is no sawah left because [this means that] the area has become tourism object...This means that the income is higher....The income in the tourist industry is better...I’m not afraid of the consequences of tourism. I see people in Gunung Kawi [tourism already exist in the area]”  (Interview Farmer GR, subak Kumba)

Due to the tourism development in the outside, some farmers who were enthusiastic about the nomination are afraid that the government will not be able to enforce the law within the WHS and avoid people selling land. They also know that the subak has not been able to enforce the local regulation to protect the agricultural land.

I hope the subak remains the same, therefore the government should encourage people to maintain their land...I don’t want to see changes in 20 years because Bali will not be Bali anymore without subak. Thus, I hope it doesn’t change. I suggest the government to apply a strong regulation concerning the land selling. The regulation must be strong. The government should think of the future if they don’t act right now. A strong regulation should be applied to prohibit people to change the function of the land or to sell it...As a pekaseh...I really hope that the government makes a strong regulation since the customary law is not quite strong to forbid people selling the land. There were cases of selling land but I didn’t know the process. No one told me. I suddenly found the land had been sold without a confirmation before [from me, the pekaseh]. I wasn’t informed before the land [was] sold. All of a sudden, there were notary’s documents [that] showed that the land had been sold.” (Interview Pekaseh MP, subak Kulub)

Hotels and villas nearby began hiring farmers within the WHS. Farmers begin working in the tourist industry (Warren 1998; MacRae and IWA Artha Wiguna, forthcoming). This means a better income compared to farming. Farming within the protected subaks has diminished.

“If I was offered to work as hotel staff I would leave the life as a farmer and start the job in the hotel industry. I’m bored of being a farmer...As economy demands increase, I need to make more money to support the family and fulfill the daily needs. In the past when the economy situation was not like today, to live as a farmer was very easy and relax.” (Interview Farmer N, subak Kulub)

As a consequence, subak becomes a less important institution and it is in danger of disappearing. Farmers depend solely on tourism and become vulnerable to tourism
fluctuations. In times of economic instability farmers can no longer rely on rice as a staple food (Lorenzen and Lorenzen, 2007). Water amount and quality decreases due to increase in hotels, villas and other businesses nearby that have recently been built in the sawah (Warren, 1998; Lorenzen and Lorenzen, 2007).

“There are houses built in the sawah and the water volume has decreased, before there was a big volume, huge amount but now is getting less because of PDAM [Public Water Distribution]” (Interview Farmer MR, subak Kumba).

The sawah has been abandoned and the ecosystem has changed. Some farmers feel disappointed about the development orientation that went on in the area.

“If the land is sold it will be narrower, the space for [the] sawah will become smaller and I don’t like that idea” (Interview Farmer SN, subak Pulagan)

Finally, due to the weakening of the subak social capital among farmers has almost eroded.
### Table 4. Scenario contrasts

<table>
<thead>
<tr>
<th>Common themes</th>
<th>Expanding agriculture</th>
<th>Cultural Tourism</th>
<th>Tourism oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main economic source&lt;sup&gt;1&lt;/sup&gt;</td>
<td>Farming market oriented</td>
<td>Subsistence farming</td>
<td>Tourism</td>
</tr>
<tr>
<td>Tourism flow</td>
<td>No tourism</td>
<td>Some tourism</td>
<td>Extensive tourism</td>
</tr>
<tr>
<td>Government involvement</td>
<td>Very involved with the community</td>
<td>+/- involved</td>
<td>Not involved at all</td>
</tr>
<tr>
<td>Agro-ecological conditions&lt;sup&gt;2&lt;/sup&gt; (Extent of cultivated areas)</td>
<td>Extent of cultivated area has increased</td>
<td>Extent of cultivated area remains the same</td>
<td>Extent of cultivated area has diminished considerably Sawah is abandoned</td>
</tr>
<tr>
<td>Subak</td>
<td>Strong subak</td>
<td>Strong subak</td>
<td>Almost disappearing</td>
</tr>
<tr>
<td>Young people</td>
<td>Migrate to other areas</td>
<td>Few job opportunities in the site</td>
<td>Many job opportunities in the area</td>
</tr>
<tr>
<td>Diversity of occupations</td>
<td>Only agriculture</td>
<td>Subsistence agriculture and tourism</td>
<td>Only massive tourism</td>
</tr>
</tbody>
</table>

<sup>1,2</sup> Extracted from Enfors et al, 2008

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### 7. Discussion

Farmers have different preferences for the future regarding the management and use of natural resources in the area. While some of them would like the area to remain the same others have in mind alternative futures that could improve their livelihoods either working as farmers or in other activities such as tourism. This shows that even within what could be considered homogenous communities there could be diversity regarding people’s preferences for the future of the area in which they live. There are several alternative futures or pathways that can show up based on the farmers’ decisions for the future of their lands. The scenarios showed in which way the
diversity of preferences for the future among the farmers could be relevant for the process of adaptive co-management.

7.1 Heterogeneity and cooperation

Co-management theory establishes as one of its antecedents having a common interest among all the groups of stakeholders involved in such a process. The results from this thesis showed that this common interest is not present even within a community considered by the theory as homogenous. Moreover, the heterogeneity of interests found within the farmers in Tampaksiring, in terms of different preferences for the future, might result problematic for arriving to a common interest (Baland and Platteau, 2000).

Evidently, communities share characteristics that might reduce transaction costs and consequently foster cooperation. However this does not mean that their preferences for the future will be the same. As Baland and Platteau (2000) have showed, heterogeneity of interests has proven problematic for arriving to a common goal. Then, diversity of preferences for future objectives within the community of farmers in Tampaksiring can inhibit collective agreement.

As shown in other studies, “achieving common positions on the regulation of rights to sell land have been among the most contentious issues confronted by [some] villages [in Bali]...Deliberations [about what to do with the land] brought to head fundamental conflicts between land as a symbol and cultural resource on the one hand, and as a productive commodity in market-oriented economic development agendas on the other.” (Warren, 2005). Therefore it was important to analyze if there was some kind of diversity of preferences within communities that could affect the management of the ecosystem.

According to Johnson (1999) a first step towards arriving to a consensus on how to manage the natural resources in a certain area involves considering how do stakeholders value the resources subjected to management. The search for consensus
among stakeholders is not fundamental before implementing adaptive co-management; rather it is more important to focus on having clear general objectives that broadly reflect all stakeholders’ values. Even though diversity of preferences for the future was found in this community, it is also possible to find common values that might help arriving to a common interest and cooperate. Therefore, it is important to have, make use, or build the relevant institutions that promote discussion and negotiation in order to arrive to this common interest. In the end, what farmers want is a better life for their children and grandchildren, so this means that there is space for negotiation.

7.2 How does diversity of preferences affect adaptive co-management and under what conditions?

Diversity proved to be relevant for the process of adaptive co-management of the cultural landscape of Bali. Adaptive co-management is a process in which several actors share power and responsibilities regarding the management of the ecosystem. One of the goals of this process is to achieve a desirable configuration of the environment that include diverse views, where actors can learn from each other in order to achieve a system configuration in which society and ecology are equally important and none of them take over the other. Even though the theory pays attention to the incorporation of diverse views between different groups of actors little attention has been paid to how groups deal with internal differences. The results showed that diversity of preferences for the future within a group of farmers could have different effects on adaptive co-management. As shown, in the scenarios the effects are numerous and are context dependent. Diversity of preferences for the future among the farmers in Bali can affect social capital, social trust, learning and consequently the adaptive capacity of the social system. There are also many variables that can determine the effect that the diversity of preferences can have on the adaptive co-management.

The first scenario, Expanding Agriculture, reflects one way in which diversity of preferences for the future can affect ACM. Social capital among farmers has weakened due to diversity of preferences for the future among the farmers combined...
with the lack of tourism in the area. The fact that farmers have different ideas for the future of the area inhibits cooperation aimed at protecting the cultural landscape. However, this diversity of preferences for the future of the area turns to be beneficial when it is combined with innovative ideas from other actors such as governmental agencies and NGOs. The ideas from governmental agencies and NGOs, together with the diversity of preferences leads to an increase of the adaptive capacity of the SES when tourism is not showing up. Consequently, the leading role that the government can take in training the farmers can promote learning and enhance social trust between farmers, NGOs and government. The management aim changes, focusing more on agriculture. This can also make farmers more vulnerable since now they are only dependant on agriculture. Besides, social memory can be lost due to the fact that younger generations are not interested in farming and therefore are migrating to other cities.

In this scenario the effect of not having tourism combined with a decrease of rice supply in Asia turns diversity of preferences within a community into an opportunity. This scenario showed that farmers having different ideas for the future regarding the trajectory that the social-ecological system in this area can provide the system with new opportunities. If all the farmers had been willing to “keep the area the same” – growing rice for self consumption– probably there would have been no change within the SES.

*Expanding agriculture* shows in which way adaptability—a concept linked to ACM—can be pursued due to diversity of preferences among the farmers regarding their future. This shows that social diversity within a group in terms of their preferences not only hinders cooperation but rather it can be a resource in turbulent times for reorganization or after a crisis as stated before by Folke and others (2005).

In sum, this scenario shows how diversity of preferences within a community can affect ACM by weakening social capital and inhibiting cooperation; but it also shows how diversity of preferences allows for an increase of adaptive capacity of the SES.

The second scenario, *Cultural Tourism*, also shows that cooperation might be hindered by diversity of preferences for the future. However, having an institution
such as the *subak* where actors can learn, discuss and arrive to consensus proves useful to arrive to a common interest. The former involves negotiation between the farmers. By working in a collaborative way different preferences for the trajectory of the SES can be incorporated into management schemes. The way in which diversity of preferences is incorporated into the management of the area is through the development of cultural tourism. There are tradeoffs, for example, farmers that were willing to sell their land and stop growing rice have changed their concept of tourism and commit to a new vision of tourism that is less intrusive both culturally and ecologically. In this way, diversity of preferences for the future also allows learning. Again, it is important to highlight the role of the *subak* as a platform for arriving to consensus.

The incorporation of diversity of preferences in the management scheme allows for increase of the social capital among farmers and consequently allows strengthening of the *subak* as an institution. Finally, the way in which tourism is incorporated into the management scheme makes it possible to increase the adaptive capacity of the system by having several economic occupations in the WHS. Due to the fact that young generations can find jobs in the area social memory can be kept.

*Cultural Tourism*, showed how the lack of willingness of some local farmers to cooperate with the government could open an opportunity for negotiation. The former if the institutions and communication channels are there for actors to make use of them in this case the *subak*. A similar institution to the *subak* within Balinese communities is the *banjar*. As stated by Warren (2005), in other cases where there have been conflicts among the Balinese brought out by different patterns of resource use and different development options, the *banjar* “was well suited to the systematic treatment of contentious issues...at least where an articulate and respected group of members were prepared to initiate and pursue the process through a combination of formal and informal channels” (Warren, 2005).

The third scenario, *Tourism Oriented*, shows how diversity of preferences may trigger a different configuration of the ecosystem if combined with other variables such as a government characterized by the lack of commitment to protecting the environment. In this scenario the government plays an important role by allowing development in
the nearby areas. This allows for an uncontrolled mass of tourism. In the beginning some farmers feel as if they have improved economically since they are working in the tourism industry and have a better salary compared to farming. However, one of the social consequences of this shift towards tourism is that farmers have stopped working together in the rice cultivation. As a result, social capital is eroded and the subak as an institution becomes weaker. By focusing just on tourism another type of diversity i.e. diversity of occupation is being lost and they became vulnerable to external shocks. Social memory also decreases as a consequence of people having other jobs than farming.

In summary, diversity of preferences for the future not only has negative effects on cooperation. There are also other effects on adaptive co-management which may be positive, for example, in making use of opportunities created by processes of change i.e. lack of tourism. The first scenario clear reflects in which way diversity of preferences could make use of these opportunities. Diversity of preferences for the future as shown in the second scenario, if properly incorporated, could provide social resilience to a social system by allowing the coexistence of different types of livelihoods that are dependent on the same set of natural resources. For example, occupational pluralism is considered an important adaptive strategy for dealing with fluctuations in resource and economic conditions (Kearney and Berkes, 2007). However, diversity of preferences for the future if linked with some specific drivers could negatively impact ACM. Diversity of preferences within farmers can lead to a different configuration of the social-ecological system and have an impact in the ability of the system to cope with shocks. For example, if almost all of the farmers within a subak have other occupational activities than farming –for example on the tourist industry– this could weaken the subak. The weakening of the subak could have an impact on ACM by failing to provide a space for discussion, negotiation and learning; moreover, this could affect retaining knowledge about past and current farming practices.
7.3 The subak as an institution

The scenarios revealed different outcomes for the subaks based on different preferences for the future within the farmers. Nowadays the subak can be seen as a source of social capital (Sutawan, interview ABC-TV). Therefore the weakening of the subak has a direct impact on the social capital. The subak is also a space for learning and knowledge generation. It is also an institution that creates cross-scale linkages across geographical scales and levels of organization regarding water management. Finally, it embodies the meanings and purpose of the community.

The subak is an institution in which farmers meet and discuss their problems regarding water allocation. As shown, the existence of diversity of preferences for the future linked with global and local drivers could affect this institution either by weakening or strengthening it. The subak as an institution could allow for understanding and construction of a common vision however it can be affected. There is a huge potential in the subak however as shown in some scenarios it can be diminished if the agricultural role within this communities is “destroyed”.

7.4 Final observations

There are several uncertain forces identified with the scenarios that could lead to different conservation outcomes of the cultural landscape of Bali. The ones presented in this thesis through the scenarios are only a few examples of different configurations for the future.

Investigating farmers’ preferences for the future together with some reasons that could back up their decisions is very important. Knowing what these preferences are and what could motivate people to change the land use is useful for coming to agreements and arriving to a common interest. Based on this information actors can negotiate. Since the Indonesian government intends to establish an environmental management plan based on the principles of adaptive co-management, special attention should be given to the capacity of the framework to address heterogeneity within communities.
The scenarios were useful in showing how drivers at different scales ranging from local to global, affect and interact with diversity of preferences within a community. The analysis of diversity regarding preferences for the future through scenarios showed to be useful for building adaptive capacity in a SES. By analyzing how diverse preferences can develop in the future combined with the analysis of the uncertainty. Finally, the current process of the nomination needs to focus not only on building new institutions at different levels and connecting them (creating cross-scale linkages among them) but also needs to focus on strengthening community institutions such as the subak. (Kearney and Berkes, 2007)

8. Conclusions

Diversity understood as different preferences for the future could affect cooperation for arriving to a common interest based on collective action theory. It is important for adaptive co-management to consider the existence of heterogeneity within what has been catalogued – by the theory of ACM– as homogeneous communities. Also, some local institutions such as the subak in Bali are a valuable asset that communities within the area can use to build-on and arrive to a common interest. In this respect it was necessary to analyze how this institution is changing and to address how social and ecological changes are driving the transformation of this organization. In this respect the role that the subak could play to arrive to a common interest is very important but there are several factors that could affect it and minimize its importance as a resource for arriving to a common interest.

By presenting three different scenarios several possible configurations of the future are presented. First they show that diversity of preferences for the future of the area is a reality coming from a homogeneous community. Second, they show how certain drivers of change could play a determinant role in the future. They highlight the way in which decisions are taken today can affect some institutions. For adaptive co-management that is of particular importance given that the theory of collective action considers that heterogeneity of interests can adversely affect cooperation. However,
there are local institutions that allow communication and exchange of ideas and could facilitate dialogue to reach to a common interest. This would be interesting to study in other cases to see if there are institutions that permit such agreements or whether any such cases of heterogeneity within communities make cooperation impossible.

Adaptive co-management as a governance strategy incorporates values from various stakeholder groups. With this thesis I have shown that the diversity from within one of those groups can affect the management process’s ability to foster collaboration, cooperative solutions, and learning. The failure to recognize the diversity within seemingly homogenous groups can lead to an under or over estimation of a system’s social capital, trust and adaptive capacity.

As its name describes it, adaptive co-management needs to be adapted to the social-ecological system in which it is intended to be used. The scenarios also add to the understanding about how the World Heritage management could develop in the future and consequently in which way the diversity of preferences could affect ACM.
9. Bibliography


MacRae, G and Arthawiguna (*Forthcoming*). Sustainable agricultural development in Bali: Is the subak an obstacle, an agent or subject?


Sutawan, N. Interview ABC-TV.


Annex 1. Driving forces

<table>
<thead>
<tr>
<th>Driving forces</th>
<th>Farmers</th>
<th>Literature</th>
</tr>
</thead>
<tbody>
<tr>
<td>New materials used for building weir and canals (cement instead of wood)**</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Construction of new roads****</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Construction of roads could bring development to the area (had changed the</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>landscape in the past and could change the landscape in the future)</td>
<td></td>
<td>Uncertain</td>
</tr>
<tr>
<td>New roads and buildings are built replacing rice terraces and irrigation</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>canals (Lorenzen and Lorenzen, 2007)</td>
<td></td>
<td>Uncertain</td>
</tr>
<tr>
<td>New rice varieties***</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Introduction of tractors (i.e. modernization of agriculture)** (before</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>farmers worked together with the principle of mutual understanding or</td>
<td></td>
<td>Uncertain</td>
</tr>
<tr>
<td>Gotong Royong)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the past, life as a farmer was easy and relaxed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the past, farmers were able to talk to each other</td>
<td></td>
<td></td>
</tr>
<tr>
<td>In the past, farmers had time to take care of their roosters</td>
<td></td>
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<tr>
<td>Soil is less fertile</td>
<td></td>
<td></td>
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<tr>
<td>Water volume has decreased and will decrease even more in the future*****</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>(urbanization in other areas has an impact on water resources) (Dam Pejeng</td>
<td></td>
<td>Uncertain</td>
</tr>
<tr>
<td>affected water level)</td>
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<tr>
<td>Water volume remains the same</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Housing in the sawah (due to increase in population)***</td>
<td></td>
<td>Uncertain</td>
</tr>
<tr>
<td>Water quality remains the same**</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Increase of waste (plastic) in canals and fields</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Waste clogging irrigation canals (Lorenzen and Lorenzen, 2007)</td>
<td>X</td>
<td>Certain</td>
</tr>
<tr>
<td>Increase of tourism (Lorenzen and Lorenzen, 2007)</td>
<td></td>
<td>Uncertain</td>
</tr>
<tr>
<td>Statement</td>
<td>X</td>
<td></td>
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<tr>
<td>---------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Tourism is increasing and could increase more in the future*</td>
<td></td>
<td></td>
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<tr>
<td>Tourists could stop visiting the area if it is changed</td>
<td></td>
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</tr>
<tr>
<td>Tourism will not change the landscape (tourists haven't been able to buy land)</td>
<td></td>
<td></td>
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<tr>
<td>Tourists buying land could change the landscape</td>
<td></td>
<td></td>
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<tr>
<td>Tourists have built houses nearby</td>
<td></td>
<td></td>
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<tr>
<td>Tourism industry/jobs/livelihoods depend on visits of tourists and is not very stable</td>
<td></td>
<td></td>
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<tr>
<td>Tourism provides jobs and benefits people</td>
<td></td>
<td></td>
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<tr>
<td>Tourism supports agriculture</td>
<td></td>
<td></td>
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<tr>
<td>Land that has been used for other purposes such as construction of villas cannot be used anymore for farming</td>
<td></td>
<td></td>
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<tr>
<td>A villa and some bungalows were built in the past</td>
<td></td>
<td></td>
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<tr>
<td>Bombs (after the bombs tourism decreased)</td>
<td></td>
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<tr>
<td>Farmers are not professional/well trained. If the land is changed to tourism it will not work</td>
<td></td>
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</tr>
<tr>
<td>Awig-awig doesn't allow subak members to sell the land*</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Awig-awig is not so strong to avoid people selling their land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Awig-awig allows farmers to sell land</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Agreement signed by farmers not to sell land</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regulation does not allow farmers to sell the sawah/land*</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Strict regulation* from the subak so the area will not change too much in the future. For example if someone wants to build a house in the sawah they should get authorization from Pekaseh</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawah can be sold, but regulation does not allow construction of hotels (i.e. tourist facilities)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Land has been sold without asking/consultation with Pekaseh</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sawah has already been sold in the area</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Sawah can be sold if it is not carik ayah</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sawah will not be sold</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
People could sell their land if they need money

People from Ubud are interested in buying land

Rising land prices (Lorenzen and Lorenzen, 2007; Warren)

Dryland might develop

Hotels and villas in the dryland

Villas will not be built in the area. The building of villas benefits only one person, not the whole community, the profit is only for one person

Uncertainty about development of the area in the future

Farmers don't sell their land because they loose the right to live in the village (desa)

If the land is sold there will be no village (desa adat)

If land is inherited it cannot be sold* or used for other purposes. The person who inherits the land is obliged to keep/maintain it.*

Children will inherit the land and they will have to work it* (there's no choice)

Children could hire people to work on their land

Javanese workers are less expensive and work more

Business have tried to change crops in the area (from rice to tobacco)

Introduction of new crops such as peanuts (by creative farmers)

Introduction of new plants such as coconut

In 2005 prices for chilies skyrocketed due to crop failures in several regions of Bali. Some farmers immediately responded and turned some of their plots into chili fields (Lorenzen and Lorenzen, 2007)

Farming is not stable. Farmers depend on the harvest.

Farming is safe, despite low income farmers can rely on their rice field for consumption

Farming provides staple food*

Harvest is enough for consumption and traditional ceremonies****
Farming small harvest

Harvesting rice gives food security even in times of economic instability (Lorenzen and Lorenzen, 2007)

| X |

Among the young generation there is no interest to farm**/* Children are not interested in farming*** (maybe in the future they will become interested)

| X |

Stigma of "dirty, uneducated farmer" lure younger generation of Balinese away from agriculture (Lorenzen and Lorenzen, 2007)

| X |

In the past they were introduced to farming since they were children (not anymore because they have other jobs)

| X |

Better off-farm working conditions such as regular working hours and better wages (Lorenzen and Lorenzen, 2007)

| X |

Off-farm jobs are better paid

Low income as a farmer**

Being a farmer is difficult (lowest position)

It is hard to improve quality of life working as a farmer*

| X |

Farmer enjoys his job

| X |

Farmer considers his job boring

| X |

Farming is hard work**

Off-farm jobs are less hard work

Working in the rice field does not take a lot of time

Plowing with the tractor takes one day giving farmers extra time for other jobs & activities

| X |

Nowadays farming is not enough to support a family*

Farmers have/need additional income (from carving, raising cattle, bone carving) other than farming*

| X |

New off-farm employment (Lorenzen and Lorenzen, 2007)

Additional income gives security in times of unfavorable agricultural or climatic conditions (Lorenzen and Lorenzen, 2007)

| X |

Farmers have other jobs (construction workers, bone & wood carves, raising cattle,
Economic situation forces farmers to earn more money

Cost of living has increased

Escalating cost of life (Warren) X

Income in the tourist industry is better than farming

Farmer expects children become farmers* with creativity X

The way in which farmers will work the land could change in the future

Farmer expects children to continue farming besides having another job

Farmer does not expect grandchildren to become farmers

Farmer expects children not to become farmers X

Farmer expects children will have a better life not as farmers X

Children are not farmers (tourism industry, school teachers, bone carvers, businessmen, government officials)*

New government

Government can make changes regarding tourism development by allowing construction of hotels X

Government can make a change by developing agricultural sector X

Government can make the area remain the same as today X

Government could encourage people to keep their land

Government decisions might change the area

Government could apply a strong regulation to avoid selling of land

Government could apply a strong regulation to ensure that farmers do not change land use of their land

Government can/could change the land use

If government wants to build something it might be allowed even on the sawah
Farmer expects governmental aid to the *subak*

Tractor was bought with governmental aid

World Heritage could keep the area the same

World Heritage could protect farmers if someone wants to make something different than farming

Harvest is three times per year (before it was two times per year)

*Subak* will exist in the future

*Subak* should not change

Strong *subak* because of *awig-awig*

After the area is officially nominated everything will be arranged and well managed

After the nomination water canals will be maintained, roads will be built

With WH, tourism will increase

Due to increase in tourism people's life will be improved, they can get more income from selling products

Roads will be built due to WH

Development of new business. On the one hand, new businesses are welcomed by the local population as a source of new off-farm employment. On the other hand, there are problems with businesses that use water illegally (Lorenzen and Lorenzen, 2007)

Harvesting was organized in mixed gender groups comprising hamlet members. Nowadays, harvesting and machine threshing is mainly done by Javanese hired by Balinese traders or women harvesters that are paid usually, they live in the same hamlet and are from a poorer background (Lorenzen and Lorenzen, 2007)
# Annex 2. List of drivers of change

<table>
<thead>
<tr>
<th>Drivers of change</th>
<th>Interviews</th>
<th>Literature</th>
<th>Certain</th>
<th>Uncertain</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Construction of new roads</td>
<td>“The road is new [and it was built] because a political party promotion Gebyar Golkar” (Farmer JGA, subak Kulub)</td>
<td>New roads and buildings are built replacing rice terraces and irrigation canals (Lorenzen and Lorenzen, 2007)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“There is a new road [which is] three years old.” (Farmer IMD, subak Pulagan)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Modernization of agriculture (associated social and technical changes)</td>
<td>“The subak has a tractor, before having a tractor the farmers worked together with the principle of mutual understanding or Gotong Royong specially in the platation [phase]” (Farmer KR, subak Kulub)</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>3 Loss of soil fertility</td>
<td>“The soil is less fertile now” (Farmer KR, subak Kulub)</td>
<td>The cumulative effect of the over-use of agrochemicals has lead to loss of soil fertility (Nomination Dossier)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“The change in the soil quality is because of the fertilizer” (Farmer MR, subak Kumba)</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4 Water volume used for agriculture (the same/decrease)</td>
<td>“The amount of water has decreased because the water is use for housing and hotels however the quality remains the same” (Farmer DPT, subak Kumba)</td>
<td>Loss of forest cover and consequent water shortages (Nomination Dossier III-5, 6)</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>“There are houses built in the sawah and the water volume has decreased, before there was a big volume, huge amount but now is getting less because of PDAM [public water distribution]” (Farmer MR, subak Kumba)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“I think water volume will decrease even more”</td>
<td></td>
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</tbody>
</table>
in the future” (Farmer DMS, subak Kumba)

“The water [volume] will not change in the future because the water coming from Mengening cannot be used for other uses” (Farmer KR, subak Kulub)

“Water comes from Mengening, since the spring is only enough for farming the quality and quantity will remain the same” (Farmer JGA, subak Kulub)

5 Water quality (the same/ increase of waste in canals)

“Water comes from Mengening, since the spring is only enough for farming the quality and quantity will remain the same” (Farmer JGA, subak Kulub)

“Water quality hasn’t changed, well just a little bit in the rainy season but [there’s a] lack of water since there’s a new water supply for the people. The water is scarce” (Farmer INM, subak Pulagan)

“In terms of water, both the quality and the volume have remained the same” (Farmer S, subak Pulagan)

6 Housing in the sawah could increase due to increase of population

“Sawah in the area will not be sold since the awig-awig (regulation) is so strict [however] the change is possible due to the growth of population. The sawah will not be sold but the land may be used for housing. It possibly occurs because in one family, for example, the number of family members will gradually increase. In one big family, there will be 13 different families living in the same location.

Waste clogging irrigation canals (Lorenzen and Lorenzen, 2007)
It is no longer possible for them to live together in a small area with the increasing number of family members. So the alternative is moving to a new place and their sawah will be used to build a new house” (Farmer N, subak Kulub)

“It could be possible to change the sawah into houses [for example] the house where I live now is full of people, family members…It is possible to use the sawah [for] housing if the situation forces him to do that” (DP son of farmer, subak Kumba)

Tourism (increase/stop visiting the area) (tourists buying land could change the landscape/tourists haven’t been able to buy land)

“If the area is as natural as today it will benefit the area because tourists like to see the nature, that’s why they come…but if there are many stores and shops the nature will be changed” (Farmer IMD, subak Pulagan)

“Tourism is not stable. On one side the income from tourist industry is very promising, however on the other side it really depends on the visit of tourists. If the land is changed into tourist facilities such as hotels, restaurants or villas it will not survive” (Farmer DKD, subak Kumba)

“I’m not afraid of the consequences of tourism. I see people in Gunung Kawi, tourism already exists in the area…I’m not worried if there’s no sawah left because the area has become tourism object. This means that the income is higher. There’s a chance to develop the area because the surroundings have become tourism objects and there are

Increase of tourism (Lorenzen and Lorenzen, 2007)

Uncontrolled expansion of tourism, which leads to the sale and fragmentation of the rice terraces (Nomination Dossier III-5, 6)
<table>
<thead>
<tr>
<th>8</th>
<th>Regulations for selling land (enforcement)</th>
</tr>
</thead>
<tbody>
<tr>
<td>“I really hope the government makes a strong regulation since the <em>awig-awig</em> (customary law) is not quite strong to forbid people selling the land” (Pekaseh MP, <em>subak</em> Kulub Atas)</td>
<td></td>
</tr>
<tr>
<td>“If there were restaurants, villas and hotels built around here the people would be more developed and it will be easier for young generations to get a job, it benefits the young generations. [How about the <em>sawah</em> then, if you like to see hotels built here?] We will not loose the <em>sawah</em> because of the regulation, maybe the dryland” (Farmer JGA, <em>subak</em> Kulub)</td>
<td></td>
</tr>
<tr>
<td>“In this <em>subak</em> it is forbidden to sell the land” (Farmer SN, <em>subak</em> Pulagan)</td>
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<tr>
<td>“<em>Awig-awig</em> doesn’t allow farmers to sell the land” (Farmer IMD, <em>subak</em> Pulagan)</td>
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<th>9</th>
<th>Development in the dryland (housing and tourism infrastructure)</th>
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<td>“No development should be done in the <em>sawah</em> but the dryland might develop, if there are hotels or villa developments this will be done in the dryland...due to strong regulation from <em>subak</em> does not allow construction of this type of infrastructure in the <em>sawah</em>...[but] if the government wants to build something it might be allowed even on the <em>sawah</em>” (Farmer S, <em>subak</em> Pulagan)</td>
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<td>“If there were restaurants, villas and hotels...”</td>
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built around here the people would be more
developed and it will be easier for young
generations to get a job, it benefits the young
generations. [How about the sawah then, if
you like to see hotels built here?!) We will not
loose the sawah because of the regulation,
maybe the dryland” (Farmer JGA, subak
Kulub)

10 **Introduction of new plants and crops**
(tobacco, peanuts, coconuts, chilies)

“Coconut trees were not here when I was a
kid”  

11 **Farming is stable** / **Farming is not stable**

“Most of the farmers could not work fully for
their land because they also have to think of
supporting their life instead of rice farming. It
doesn’t mean that they are going to leave their
land as they know that life as a farmer is safe.
Despite the low income they can still depend
on the harvest of their rice fields for
consumption” (Farmer DKD, subak Kumba)

“I want my grandchildren to have a better life,
not as a farmer, escape from this condition
because being a farmer is not a stable income,
I would like my grandchildren to earn a stable
income.” (Farmer DMS, subak Kumba)

“I don’t want to see my sawah changed. I
want "tileh uma" (tileh=still the same,
uma=sawah). I don’t want to sell the land
because I know that the money I get when the
land is sold cannot be saved in relatively long
time. I realize that owning the sawah is more
important than having much money, which is
just for a short time. I don’t want to loose my
sawah. The crops from the land can support

New rice varieties introduced with the Green
Revolution (Lansing, 1995)

Harvesting rice gives food security even in
times of economic instability (Lorenzen and
Lorenzen, 2007)

Additional income gives security in times of
unfavorable agricultural or climatic
conditions (Lorenzen and Lorenzen, 2007)
my life forever but the money that comes from land selling will only remain one year” (Son of farmer, KD, subak Pulagan)

Changing interest in farming in younger generations

“I understand that my children don’t want to go the sawah because they are still young but maybe in the future they will be interested” (Farmer IMD, subak Pulagan)

“My son who is 26 years old doesn’t want to work in the sawah but maybe in the future since he will inherit the sawah, there’s no other choice and he will have to work there” (Farmer SN, subak Pulagan)

“…people don’t want to go to the rice fields to work as farmers…my son doesn’t want to work in the rice field and maybe my grandchildren will not be farmers….although he doesn’t want he will go to the rice field because there will be no other person [to take care of the land] or he will try to maintain the sawah by whatever means. He has understood that the sawah will be inherited to him, but he knows that it comes from his ancestors so he will not try to sell it” (Farmer INM, subak Pulagan)

Stigma of “dirty, uneducated farmer” lure younger generation of Balinese away from agriculture (Lorenzen and Lorenzen, 2007)

Better off-farm working conditions

“I don’t enjoy being a farmer because of the low income. The income in the tourist industry is better” (Farmer GR, subak Kumba)

“If I was offered to work as hotel staff I would leave the life as a farmer and start the job in the hotel industry. I’m bored of being a farmer…As economy demands increase, I

Better off-farm working conditions such as regular working hours and better wages (Lorenzen and Lorenzen, 2007)
need to make more money to support the family and fulfill the daily needs. In the past when the economy situation was not like today, to live as a farmer was very easy and relax.” (Farmer N, subak Kulub)

“Being a farmer is a big job” (Farmer JGA, subak Kulub)

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<th>Low income as a farmer</th>
<th>Increased cost of living</th>
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<td>14</td>
<td>“…life as a farmer gains low income but expenses for life increase significantly. Today’s situation is really different comparing with the situation in the past in the sense that the necessities of life increase sharply.” (Farmer DKD, subak Kumba)</td>
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“Life as a farmer gains low income but expenses for life increase significantly. Today’s situation is really different comparing with the situation in the past in the sense that the necessities of life increase sharply.” |

Low income from rice farming (Nomination Dossier IV-2) | X |

“I don’t enjoy being a farmer because of the low income. The income in the tourist industry is better” (Farmer GR, subak Kumba)

“The income as a farmer is not enough” (Farmer DMS, subak Kumba) | X |

“In the past being a farmer could be a main job, but now since the economy demands grow significantly, farmers need to support their family’s life by trying to get additional income from many other activities like carving and raising cattle” (Farmer DKD, subak Kumba)
Children could become farmers / Does not expect children or grandchildren to become farmers

“I want my sons to be farmers like I am…I expect that one day my sons are able to continue working in the land with more creativity. It means that they know how to develop an effective farming with business oriented. The sons must be creative to manage their farming in which the harvest can be used for family’s consumption and also to make money. Creativity also means utilizing the narrow lands effectively. The narrow land can be utilized by the farmers to plant the materials needed for traditional ceremonies such as coconuts, flowers for offerings and bananas… I hope my sons are able to manage the land productively. They have to find ways to market their crops since farming means nothing if the crops they yield cannot be marketed…I want my sons to be farmers and carry out an intensive farming with more varieties of crops” (Farmer DKD, subak Kumba)

“I want the area to change in the future, I don’t want my children to become farmers. I expect that my children lives would be better” (Farmer GR, subak Kumba)

“I expect my grandchild to continue my job as a farmer because my son is already working as a businessman. I would like a better life for my grandchild, as a farmer, but a better life.” (Farmer DPT, subak Kumba)
Government can 1) boost tourism development by allowing construction of hotels 2) promote the agricultural sector 3) encourage people to keep their land, apply a strong regulation to avoid selling of land and/or to ensure that farmers do not change land use

1) “I expect that hotels can be built in the area so it can be as good as Ubud, or as in Ubud…if the previous Bupati (regent) had been reelected it would have been possible to build a hotel” (Farmer GR, subak Kumba)

2) “The government must be able to give the farmers a hand in order to make them professional farmers. Most importantly, the government should encourage the farmers and show them ways to sell their crops” (Farmer DKD, subak Kumba)

3) “…the government [should] apply a strong regulation concerning the land selling. The regulation must be strong. The government should think of the future…A strong regulation is applied to prohibit people to change the function of the land or to sell it…I really hope the government makes a strong regulation since the awig-awig (customary law) is not quite strong to forbid people selling the land” (Pekaseh MP, subak Kulub)

“I would like the area to remain the same for my grandchildren but it depends on the government” (Farmer DPT, subak Kumba)

“Changes in the area might be as a result from government decision; if the government wants to build something it might be allowed even on the sawah” (Farmer S, subak Pulagan

a Harvesting rice gives food security even in times of economic instability

b Additional income gives security in times of unfavorable agricultural or climatic conditions
Stigma of dirty, uneducated farmer lure younger generations of Balinese away from agriculture.

For example, regular working hours and better wages. Off-farm jobs are better paid and imply less hard physical work.