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Maladaptive trajectories of change in Makira, Solomon Islands

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ABSTRACT

Trajectories of change are dynamic processes of individual, group and/or societal responses to change which create further change and responses, with outcomes that reflect the cumulative properties of those processes. Understanding trajectories of change is an important initial step for designing appropriate adaptation strategies because even though responses may enable people to cope with change in the short term, the accumulated responses of individuals can generate undesirable maladaptive outcomes over longer periods of time. This paper examines trajectories of change in Kahua, Solomon Islands, where people have traditionally relied on subsistence activities and have in the past been subsistence affluent. Participatory methods, including 76 focus group discussions in 38 communities with 821 individuals, were used to determine changes in the region and its drivers. A conceptual model was developed of the underlying feedback processes within the Kahua social–ecological system. The results show that communities are facing rapid and extensive changes. Most changes, however, are being driven by the two key drivers of population growth and a strong desire for monetary prosperity that act synergistically to generate stress in communities. People are generally responding by focusing on income generation, which is reinforcing stress in communities and resulting in maladaptive trajectories of change. The results suggest development policy in the Solomon Islands needs to: (1) take the challenges of population growth much more seriously; (2) place greater effort on development activities that reduce per capita impact on the environment; (3) improve management of the high expectations for monetary prosperity; (4) increase emphasis on wellbeing aspects of development rather than income generation per se, and (5) better align development with existing adaptation strategies to ensure that vulnerability to future global change does not increase.

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1. Introduction

Adaptive strategies are important for reducing the vulnerability of local communities to global change (Butzer, 1980; MEA, 2005). There are, however, significant challenges in identifying the kinds of responses to change that will deliver desired benefits while also avoiding undesirable outcomes. Many responses to change may not help people to cope with change (Caballero, 2009), can worsen existing problems (Barnett and O'Neill, 2010; Eriksen et al., 2005; Fazey et al., 2010a), or may reduce capacities to respond to future events (Barnett and O'Neill, 2010; Fazey et al., 2010a; Swanson and Bhadwal, 2009). These responses are often described as 'maladaptive'. This term originated in evolutionary biology to describe the behaviours or traits of species that hinder their ability to survive in particular conditions (Menard, 1998; St Clair and Howe, 2007). The term maladaptation is increasingly being used in global change literature to highlight the pitfalls of poorly directed adaptation strategies (Barnett and O'Neill, 2010).

Whether an adaptive response is considered desirable is subjective, with any response likely to have both winners and losers (Adger, 2006; O'Brien and Leichenko, 2000). The term 'maladaptation' is therefore problematic. Nevertheless, at community or societal scales, there are some outcomes that are clearly more desirable than others. Societal responses, for example, have resulted in the crossing of important social, economic, or ecological thresholds (Folke et al., 2004; Kinzig et al., 2006; Reyers et al., 2009) which has led to poverty and rigidity traps where capacity to maintain livelihoods and wellbeing is limited (Allison and Hobbs, 2004; Anderies et al., 2006; Holling and Meffe, 1996) or the collapse of whole societies (Hegmon et al., 2008;

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Janssen and Scheffer, 2004). Outcomes of societal responses therefore differ in relation to broader normative and positive goals of long-term social, economic, and ecological viabilities and equity, or in the way they enhance or erode resilience (Adger et al., 2006; Barnett and O'Neill, 2010; Fazey et al., 2010a; Plummer and Armitage, 2007).

The outcomes of responses to change emerge through trajectories of change. We define a trajectory of change to be a dynamic process of individual, group and/or societal responses to change which create further change and responses with outcomes that reflect the cumulative properties of that process. Understanding trajectories of change is an important initial step for designing appropriate adaptation strategies. This is because while individual responses may increase capacity to cope with change, the accumulated responses of individuals can, in the long-term, generate undesirable outcomes for communities or societies (Fazey et al., 2010a; Sterman, 2000). That is, responses to change may appear to be rational adaptations for individuals, but can still generate maladaptive trajectories for communities and societies in the longer term.

One of the ways that maladaptive trajectories of change can manifest is through dynamic processes that increase vulnerability to future change over time. Many adaptive strategies are developed through a process where the internal dynamics of a system are assumed to be relatively stable. In such cases, exogenous stressors (climate, economic markets) are modelled to provide future scenarios to determine how the system might be affected, the results of which then inform the development of adaptive strategies. An example is the development and assessment of different future scenarios for rainfall which are then translated to risk and vulnerability of communities as they are understood at present. The context and extent to which people are vulnerable to stressors are, however, continuously changing (Leichenko and O'Brien, 2008; Mbow et al., 2008; Nielsen and Reenberg, 2010; O'Brien and Leichenko, 2000). Erroneous interpretations of the vulnerability of communities can therefore be made if the resilience of communities is significantly different by the time the future predicted scenarios of global change become apparent (Leichenko and O'Brien, 2008; Werrity et al., 2007).

Understanding trajectories of change is a significant challenge. Adaptation is a dynamic process, where responses to change result in further change and a possible need for additional adaptive responses (Bosello et al., 2009; Butzer, 1980; Marshall et al., 2010; Smit and Wandel, 2006). There are also usually multiple drivers, high degrees of uncertainty in predictions of the future conditions to which people are supposed to be adapting to, and multiple and diverse sets of actors that continually modify local conditions and context (Barnett, 2001; Eakin et al., 2009; Lambin et al., 2003; Menton, 2003; Silva et al., 2010). Possible methods that can help overcome some of the methodological challenges include livelihoods approaches, timelines, assessing perceptions of risk and vulnerability and comparisons of historical and remote sensing data (Eakin, 2005; Mbow et al., 2008; Nielsen and Reenberg, 2010; Reenberg et al., 2008). Methods also include models that explain the underlying dynamics of a system rather than just its behaviour (Fazey et al., 2006; Howe, 2010; Sterman, 2000). This involves understanding key feedback processes that generate system behaviour, which allow better informed judgments about the likely influence of external drivers (e.g. development interventions) and future trajectories of change and its implications for vulnerability.

This study examines the trajectories of change in Kahua, a region of Makira Ulawa Province in the Solomon Islands (SI), by building conceptual models of system dynamics using perceptions of change of local people. Historically, communities in SI have been affluent in subsistence resources due to both relatively low population densities and a large terrestrial and marine natural resource base (Foale, 2008a,b) but are now experiencing changes that are affecting the resilience of social–ecological systems (Birch-Thomsen et al., 2010; Feinberg, 2010; Foale, 2008b; Reenberg et al., 2008). Overall, the paper aims to provide preliminary assessments of the key drivers and trajectories of change and their implications for the vulnerability of communities to future change. The paper addresses three main questions: (1) What is the current demographic situation in Kahua and how do opportunities for income generation differ between subregions? (2) What changes are occurring in Kahua? (3) How do these changes interact to generate key drivers and trajectories of change? The results include a conceptual model of the underlying feedback dynamics of the Kahua social–ecological system, which is used to inform understanding of likely future trajectories and vulnerability of communities to future change.

2. Methods

2.1. Study area

Kahua is located at the eastern end of Makira Island, SI (Fig. 1). Makira is mountainous and located in one of the wettest regions of the globe, with little annual variation in temperature (Brookfield, 1969; Leary, 1992), and an average annual rainfall of 3600–4000 mm, with no dry month (Allen et al., 2006). It is in a region that has some of the highest species endemism and diversity in the world (Danielsen et al., 2010; Green et al., 2006; Lamoreux et al., 2006; Wein and Chatterton, 2005). Kahua is characterised by forested slopes that rise steeply from the coral and rocky fringed coast to around 1000 m. It has 42 communities, the majority located along the coast (Fig. 1). There are no roads or electricity in the region and mobile phones are not yet in operation.

Most people in Kahua rely on subsistence activities, including cultivation of gardens, fishing, and use of a wide range of forest resources for building materials and food. These resources rely on access to land, with tenure established through genealogy and tribal affiliations. Land tenure currently appears to be a mix of communal and private ownership. The trend is towards private ownership as land is increasingly seen as being valuable for income generation and as families continue to subdivide land for distribution to new generations.

Income, which is mainly used to pay school and medical fees and transport, is usually acquired through the production of copra (dried coconut) and cocoa, marketed through middlemen who mostly transport it by ship to the capital, Honiara. Some people also have small stores that sell basic items (sugar, salt, canned fish, tobacco, matches, etc.). Income per household is not known and is very difficult to calculate as much of income generation is seasonal (e.g. cocoa). Sometimes money exchanges hands for some activities (e.g. building work, food, and timber). However, local markets are very rare as there is very little income circulating in the region. There is also no employment per se within the region except for a small number of teachers and clinic staff. Those who are employed live outside the region in either the provincial town or the capital Honiara. Discussion about incomes with research assistants (RAs) and members of the community suggests that families may earn anywhere between US$ 100–2000 per year, with income largely dependent on families having access to land for cash cropping.

Communities are usually headed by a chief, who are almost always male. The chiefs have some power in decision making but also need to put considerable effort into maintaining credibility and popularity to retain their position. There is also a strong tradition of dialogue and discussion in communities for collective styles of decision-making (Fazey et al., 2010b). These factors result in much flatter hierarchies of power in Kahua than, for example,

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