Land Use Policy 41 (2014) 31–44

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

From coping to adaptation to economic and institutional change – Trajectories of change in land-use management and social organization in a Biosphere Reserve community, Mexico

E.N. Speelman[a,*], J.C.J. Groot[a], L.E. García-Barrios[b], K. Kok[c], H. van Keulen[d,1], P. Tittonell[a]

[a] Farming Systems Ecology, Plant Sciences Group, Wageningen University, Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands
[b] El Colegio de la Frontera Sur, Carretera Panamericana y Periférico Sur S/N, Maria Auxiliadora, San Cristóbal de las Casas, Chiapas, Mexico
[c] Soil Geography and Landscape, Environmental Sciences Group, Wageningen University, Droevendaalsesteeg 3, 6708 PB Wageningen, The Netherlands
[d] Plant Production Systems, Plant Sciences Group, Wageningen University, Droevendaalsesteeg 1, 6708 PB Wageningen, The Netherlands

ARTICLE INFO

Article history:
Received 6 September 2013
Received in revised form 17 April 2014
Accepted 21 April 2014

Keywords:
Adaptive capacity
Resilience
Vulnerability
Drivers
Smallholder farming

ABSTRACT

Smallholder farming communities are increasingly affected by local impacts of international market dynamics, and (inter)governmental economic and nature conservation policies to which they respond through coping or adaptation. Although the attributes that underpin the capacity to adapt are widely agreed upon in literature, empirical evidence on how rural communities can develop adaptations are still scarce. Here, we provide such evidence based on a comprehensive driver-response reconstruction of a community in the buffer-zone of a Biosphere Reserve in Chiapas, Mexico. We found that coping (between 1990 and 2000) was gradually replaced by adaptations (1995–2010) based on: (i) diversification of land-use, (ii) improved social organization, (iii) improved communal decision-making, and (iv) more sustainable forms of land management. The diversification of local farming systems through inclusion of organic forest-based palm and coffee cultivation and the establishment of associated organizations, formed the basis of these changes. These adaptations were mainly supported by improved social, institutional and political capital. Communal forest resources, long-term support of an NGO and a highly motivated population, were essential circumstances that allowed these trajectories to develop. However, current unequal land and power distribution could undermine and debilitate adaptive capacity. Communities and supportive organizations need to be aware and capable to adjust continuously to prevent today's adaptation strategies from becoming tomorrow's coping responses.

Introduction

Global change challenges rural households and communities all around the world to develop responses that secure the continuation of their livelihoods (Fabricius et al., 2007). The capacity to respond to e.g. climatic and demographic changes and international market dynamics is mainly dependent on natural, economic and social resource availability and the capability to utilize these resources (Wall and Marzall, 2006; Nelson et al., 2007). Smallholder farming communities are thought to be relatively more challenged by change (Eakin and Lemos, 2010), due to the fragile environments they are often located in, and their limited natural, economic and social resources (Van Keulen, 2006). Natural resource management and social organization of smallholder communities are largely determined by the often conflicting local effects of global economic and institutional change (e.g. Lambin et al., 2001; Wadley et al., 2006; Grau and Aide, 2008; Barraquand and Martinet, 2011). Price drops associated with trade liberalization, subsidy abolishment and cheap imports that push farmers to intensify production, or limitations imposed by governmental policies to protect natural resources are just some common examples of such changes (e.g. Nagendra et al., 2006; Milgroom and Spierenburg, 2008; García-Barrios et al., 2009; Ribeiro Palacios et al., 2013). Improving the capacity of farmers and communities to respond in a sustainable manner to global and local drivers such as community projects is deemed essential for the future of rural livelihoods. This is especially the case, as the frequency and severity of (unexpected) changes e.g. climate events and market dynamics, are expected to increase (Eakin and Lemos, 2010).

The adaptive capacity of a system is the foundation for the development of adaptation strategies and has been defined as the

* Corresponding author. Tel.: +31 (0)317 481191; fax: +31 (0)317 481203.
E-mail address: Erika.Speelman@wur.nl (E.N. Speelman).
[1] Deceased.

http://dx.doi.org/10.1016/j.landusepol.2014.04.014
0264-8377/

ability of individuals and communities to modify natural resource management in a sustainable way in response to actual, perceived, or expected drivers or pressures (Folke et al., 2003; Armitage, 2005). Adaptive capacity is thought to improve the resilience of a system and reduce its vulnerability. It allows the system to avoid or move from an undesirable to a desirable state (Folke, 2006). Improving system's adaptive capacity allows initial coping responses to be transformed into adaptation strategies. The basis for adaptive capacity has been described and agreed upon extensively in literature and includes e.g. flexible institutions, knowledge exchange and equitable resource access (see e.g. Yohe and Tol, 2002; Folke et al., 2003; Walker et al., 2006). However, understanding on how rural communities can improve their adaptive capacity still needs sufficient empirical data (Eakin and Lemos, 2006).

When faced with global, national or local changes with (expected) major impacts at the local level, rural households generally respond by changing land-use practices while communities might adjust organizational structures. Resulting trajectories of change vary and can be categorized as: (1) Coping: characterized as a re-action response triggered by past or current drivers, and (2) Adaptation: characterized as deliberate management adjustments in response to past, current and future drivers (Nelson et al., 2007; Fabricius et al., 2007). Coping is a common immediate response to change, but does not necessarily prepare a system for future changes and is therefore mainly effective in the short-term. Adaptation deliberately anticipates future or expected changes and is therefore generally effective in the long-term. Coping responses may include (temporary) out-migration and increasing off-farm income sources (e.g. Robson and Berkes, 2011; Ribeiro Palacios et al., 2013). Adaptation strategies are often based on (strengthened) social networks, re-orientation of agricultural production, improvement of infrastructure, improving (local) organizational structures or diversification of production systems (e.g. Saldaña-Zorrilla, 2008; Huber-Sannwald et al., 2012). However, these strategies strongly differ depending on the initial resource availability and potential within the system or household.

We aimed to contribute new empirical evidence and insights around the pivotal research question: how and under which circumstances do households and communities improve their capacity to strengthen adaptation to an increasingly changing and demanding economic and institutional environment. We addressed this question through a thorough analysis of past responses to multi-level drivers of change and an assessment of adaptive capacity in the smallholder farming community of Tierra y Libertad (TyL), in Chiapas, Mexico. Over the past fifty years, this relatively young community was confronted with frequent and large economic and institutional pressures at the global, national and local levels. These pressures included a strong decline in the price of their main produce as a result of (i) trade liberalization, and (ii) land-use limitations associated with the establishment of an UNESCO's Man and Biosphere (MAB) Reserve in the region. MAB Reserves were developed as mechanisms that aim to combine natural resource conservation and (sustainable) agriculture (see e.g. Nagendra, 2002; Bray et al., 2003; Berkes, 2007; Orozco-Quintero and Davidson-Hunt, 2009). We describe the local trajectories of change (Trajectories of change section) by examining changes in multi-level economic and institutional drivers (Economic and institutional drivers section) and the associated community responses in social (re-)organization (Changes in social organization section), and land management (Changes in land management section). Subsequently, we analyzed adaptation (Analysis of adaptation section) by evaluating the response mechanisms of coping and adaptation (Coping and adaptation section) and assessed the development of adaptive capacity through a resource-based framework (adapted from: Yohe and Tol, 2002; Wall and Marzall, 2006; Eakin and Lemos, 2006) (Adaptive capacity assessment section). We discuss the findings of this research in relation to previous studies and analyze their implications for our current understanding of social organization and institutional change (Discussion section).

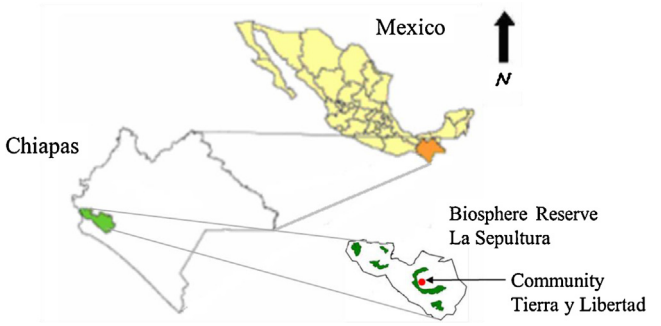

Fig. 1. Geographical location of the MAB Reserve La Sepultura and the community Tierra y Libertad, Chiapas, Mexico. The five dark green areas in the Reserve map show the Reserve's core areas. The community is bordering the largest of these five core areas within the Reserve. (For interpretation of the references to color in this figure legend, the reader is referred to the web version of the article.)
Source: INE.

Case study background

Economic and institutional policies

Between 1950 and 1982, Mexican agricultural policies were aimed at protecting the national market and achieving self-sufficiency in staple foods, in particular maize. In 1965, a secure market with guaranteed prices was established, by which the whole market chain was managed by the state-owned *Compañía Nacional de Subsistencias Populares* (CONASUPO). In 1982, the Latin-American debt crisis started and Mexico was pressured to implement neoliberal policies toward (open) market-driven governance, which resulted in the dismantling of CONASUPO in 1989. Consequently, staple food prices became more dependent on the international market. In 1994, the North American Free Trade Agreement (NAFTA) between USA, Canada and Mexico was ratified with devastating effects on the farm-gate price of maize (e.g. Nadal, 2002; Yunez-Naude, 2003; Appendini, 2008; Keleman et al., 2009). In a response, national and local governments developed policies such as subsidies and credits for alternative land-use types, to assist farmers to adjust their production systems.

In 1992, Mexico ratified the legally binding Convention on Biological Diversity (CBD) at the Earth Summit in Rio de Janeiro. This initiated active national conservation policies. Mexico's natural protected areas program (1995–2000) was developed to expand protected natural areas (INE, 1999). The Mexican government established the 'La Sepultura' MAB Reserve as one of the pilot areas of the program in the northeastern part of the Sierra Madre de Chiapas, in 1995 (6°00′18″ and 16°29′01″ N and 93°24′34″ and 94°07′35″ W) (INE, 1999). MAB Reserves consist of core zones – in which human activity is strictly forbidden – and buffer-zones – where farming is allowed under a set of restrictions to protect the environment. Large-scale land clearing, timber and non-timber extraction except the collection of firewood, and the use of fire to clear and prepare fields for sowing are prohibited in the buffer-zone. La Sepultura Reserve (167,309 ha) consists of less than 10% (13,759 ha) of core zone, fragmented in five patches, and the rest of the area (153,550 ha) is buffer-zone (Fig. 1).

Mexican land tenure

Land reform that was promised after the Mexican revolution of 1910, only really began after the official re-introduction of the old