

# Perceptions of climate variability and livelihood adaptations relating to gender and wealth among the *Adi* community of the Eastern Indian Himalayas



Ranjay K. Singh <sup>a,\*</sup>, Kerstin K. Zander <sup>c</sup>, Satyendra Kumar <sup>b</sup>, Anshuman Singh <sup>b</sup>,  
Parvender Sheoran <sup>b</sup>, Arvind Kumar <sup>b</sup>, S.M. Hussain <sup>a</sup>, Toge Riba <sup>a</sup>, Orik Rallen <sup>d</sup>, Y.J. Lego <sup>e</sup>,  
Egul Padung <sup>f</sup>, Stephen T. Garnett <sup>g</sup>

<sup>a</sup> College of Horticulture & Forestry, Central Agricultural University, Pasighat, 791102, Arunachal Pradesh, India

<sup>b</sup> ICAR-Central Soil Salinity Research Institute, Karnal, 132001, Haryana, India

<sup>c</sup> The Northern Institute, Charles Darwin University, Australia

<sup>d</sup> Village Sibus, Pasighat, 791102, East Siang, Arunachal Pradesh, India

<sup>e</sup> Village GTC Colony, Pasighat, East Siang, 791102, Arunachal Pradesh, India

<sup>f</sup> Doying Gumin College, Pasighat, East Siang, 791102, Arunachal Pradesh, India

<sup>g</sup> Research Institute for the Environment and Livelihoods, Charles Darwin University, Australia

## ARTICLE INFO

### Article history:

Received 11 July 2016

Received in revised form

9 June 2017

Accepted 10 June 2017

### Keywords:

Arunachal Pradesh

East Siang

Perceived climate variability

Livelihood portfolios and risks

Gender and autonomous adaptation

## ABSTRACT

The impacts of extreme weather events and climate variability on natural resource dependent farmers will further increase their vulnerability. This study describes how *Adi* farmers in Arunachal Pradesh (India) perceive and adapt to climate variability, and how this is influenced by gender and wealth. A total of 65 male and 71 female *Adi* farmers were interviewed or participated in focus group discussions. Both men and women have noticed there are fewer rainy days, longer summers, shorter winters and more erratic rainfall. However, some perceptions of change were gender and/or wealth class specific. *Adi* women noticed changes across areas they control including collecting forest foods, crop harvesting, and fermenting and storing of food. Men noted climate variability had made hunting wild game and marketing agricultural produce more difficult. Wealthy people were better placed to adapt to climate variability than poorer people because they could *intensify* their production systems. They switched to rainfed maize with improved varieties and horticultural cash crops which need more costly inputs. Wealthy people, particularly men, also received more advice and training than poorer people. Poorer farmers, particularly poor women, adapted predominantly by *diversifying* activities, such as using drought tolerant oil seeds and subsistence horticultural crops, accessing forest-based resources, rearing pigs and poultry, increasing fishing and the making of handicrafts. *Storage, exchange* and *pooling* of local resources were further strategies of the poor. This deeper understanding of *Adi* livelihood adaptation strategies will help increase their resilience by improving targeting of location specific extension services and adaptation policies.

Crown Copyright © 2017 Published by Elsevier Ltd. All rights reserved.

\* Corresponding author. Current address: ICAR-Central Soil Salinity Research Institute, Karnal, 132001, Haryana, India.

E-mail addresses: [ranjaysingh\\_jbp@rediffmail.com](mailto:ranjaysingh_jbp@rediffmail.com) (R.K. Singh), [Kerstin.Zander@cdu.edu.au](mailto:Kerstin.Zander@cdu.edu.au) (K.K. Zander), [sky\\_72@rediffmail.com](mailto:sky_72@rediffmail.com) (S. Kumar), [anshumanari@gmail.com](mailto:anshumanari@gmail.com) (A. Singh), [Parvender.Sheoran@icar.gov.in](mailto:Parvender.Sheoran@icar.gov.in) (P. Sheoran), [arvind.kumar2@icar.gov.in](mailto:arvind.kumar2@icar.gov.in) (A. Kumar), [rubu28903@gmail.com](mailto:rubu28903@gmail.com) (S.M. Hussain), [togeriba@gmail.com](mailto:togeriba@gmail.com) (T. Riba), [orikralen2012@rediffmail.com](mailto:orikralen2012@rediffmail.com) (O. Rallen), [egoyanung@gmail.com](mailto:egoyanung@gmail.com) (Y.J. Lego), [egulpadung@yahoo.co.in](mailto:egulpadung@yahoo.co.in) (E. Padung), [stephen.garnett@cdu.edu.au](mailto:stephen.garnett@cdu.edu.au) (S.T. Garnett).

## 1. Introduction

Extreme weather events and climate variability are adversely affecting global food systems, local livelihoods and the provision of ecological services (Ericksen, 2008; IPCC, 2014). These impacts are likely to increase (IPCC, 2014) with poor communities dependent on natural resources likely to be particularly vulnerable (Kelly & Adger, 2000; Agrawal, 2008). In India, frequent climate aberrations are already posing problems for agriculture (Moorhead,

2009) where a lack of capital and technology are inhibiting adaptation (O'Brien et al., 2004). In the past five years, major agricultural areas in India have experienced more high intensity rainfall events but fewer rainy days, as well as more frequent severe floods and droughts (Miyan, 2015). To address these problems, capacity building projects such as the National Initiative on Climate Resilient Agriculture (NICRA) project have been implemented through various agencies by the Government of India to improve adaptive capacity of rural communities (CRIDA, 2012, pp. 1–188).

Mountainous Arunachal Pradesh in north-east India has been identified as the Indian state most vulnerable to climate change (Ravindranath et al., 2011), being particularly susceptible to rainfall variability and drought (Kumar, Rajeevan, Pai, Srivastava, & Preethi, 2013). Substantial increases in climate variability have already occurred (Das et al., 2009). Poverty, inadequate and unreliable infrastructure, poor communication and weak institutional support (Agrawal, 2008) compound vulnerability due to climate change and are already adversely affecting farmers' livelihoods (Singh, Bhowmik, & Pandey, 2011). In response, the State government has developed a climate change plan to mitigate and adapt to the potential risks (GoAr, 2011). However, to provide effective advice and assistance, it is important to understand which aspects of climate variability are perceived by local communities to be affecting them and in what manner (Deressa, Hassan, Ringler, Alemu, & Yesuf, 2009; Vedwan, 2006).

An important component of understanding climate change impacts on communities can be gender (Villamor, Desrianti, Akiefnawati, Amaruzaman, & van Noordwijk, 2013) and there is a growing realisation of the need to understand adaptation from the viewpoint of both women and men (Bhattacharai, Beilin, & Ford, 2015). In many societies men and women are likely to experience and react to climate change in different ways because of the nature of

their roles (UNDP, 2011, pp. 1–185). This then affects how they adapt to climate stressors (González, Belemvire, & Saulière, 2011; Mason & Agan, 2015). However, a binary gender analysis may be inadequate and lead to perverse outcomes if other factors are not also considered (Carr & Thompson, 2014). Gender effects are often intertwined with other factors such as socio-economic background, power, knowledge and access to resources (Agrawal, 2008; Carr & Thompson, 2014; Cott, 2009). Relative wealth, even in generally poor societies, can also influence adaptation pathways (Muttarak & Lutz, 2014) because of differences in the type and extent of the asset base (Chambers & Jiggins, 1987) and access to education opportunities that enable incorporation of new ideas into local practice (Muttarak & Lutz, 2014).

In this study our three main objectives have been to understand how gender and wealth are affecting: (i) perceptions of climate variability among *Adi* farmers in Arunachal Pradesh, (ii) the influence of this variability on their livelihoods, and (iii) the strategies being adopted to cope with climate variability.

## 2. Research methods

### 2.1. Study area

This study was conducted in Arunachal Pradesh which, with 28 major tribes, 110 sub-tribes and high numbers of unique species, is considered as one of the world's biocultural diversity hot-spots (Myers, Mittermeier, Mittermeier, Da Fonseca, & Kent, 2000; Woodley, 2010). The *Adi* people live in the humid East Siang District of Arunachal Pradesh 80–120 m above sea level (Fig. 1). Average minimum and maximum temperatures of 15.5°C and 25.0°C have increased by 0.4°C and 0.3°C, respectively, from 1901–1971 to 1972–2002 while average rainfall, subject to substantial orographic variation, fell by about 70 mm from 1950 mm

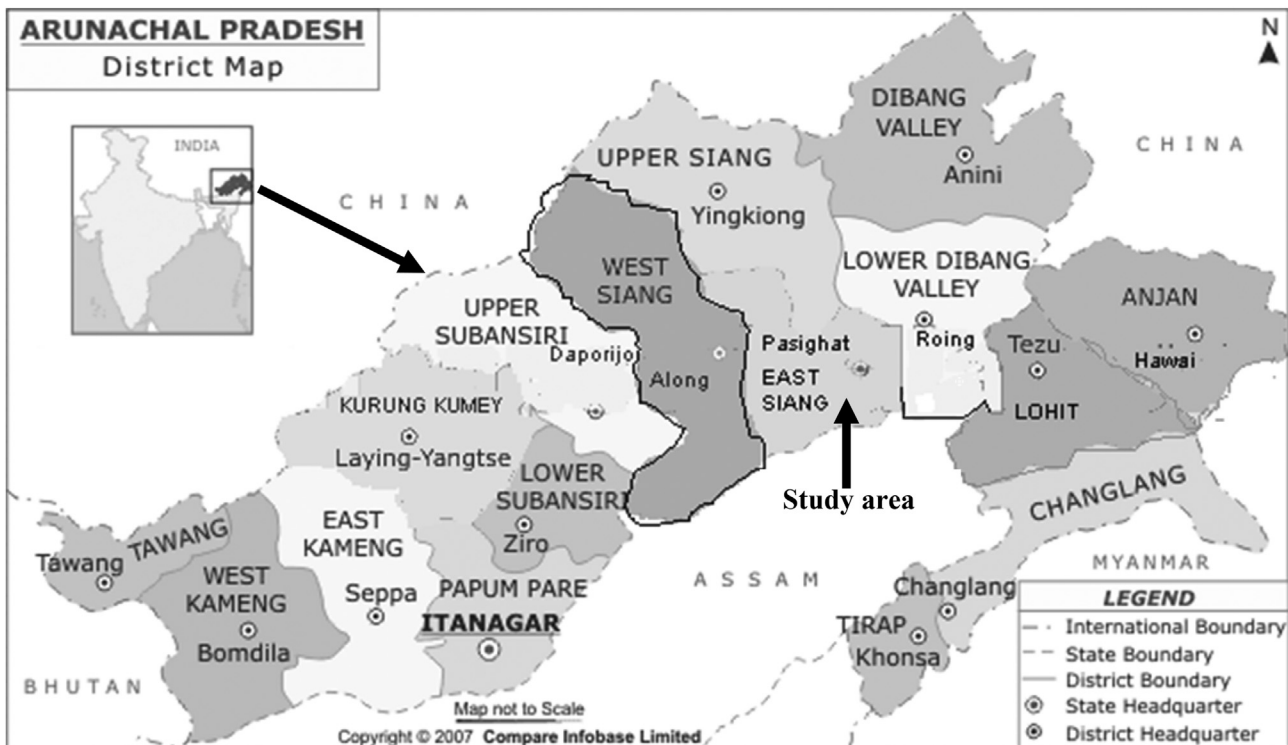


Fig. 1. Location of study site in East Siang district, Arunachal Pradesh, India.

Source: <https://www.google.co.in/search?q=Map+of+Arunachal+pradesh> (Map of Arunachal Pradesh, 2017)

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات