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A gender-focused analysis of learning processes in an action research and development program in Nepal

Masterarbeit

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Agrar- und Ernährungswirtschaft

Eingereicht von: Katharina Anna ZANGERLE, M.Sc.
Matrikelnummer: 1053400

BetreuerInnen:

Priv.-Doz.ⁱⁿ Dr.ⁱⁿ Maria Wurzinger, Centre for Development Research (CDR)

Mag. Dr. Lorenz Probst, Centre for Development Research (CDR)

Dipl. Ing.ⁱⁿ Dr.ⁱⁿ Romana Roschinsky, Centre for Development Research (CDR)

Manindra Malla, Caritas Nepal

Chintan Manandhar, Caritas Nepal

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Table of content

List of Figures	iii
List of Tables.....	iv
Abbreviations.....	v
Abstract	vi
Zusammenfassung.....	viii
Acknowledgements.....	x
1. Introduction.....	1
2. Research context.....	3
2.1 Climate, agro-ecological zones and agricultural challenges	3
2.1.1 Climate.....	3
2.1.2 Agroecological zones.....	4
2.1.2.1 Mountains.....	4
2.1.2.2 Hills	5
2.1.2.3 Terai.....	6
2.1.3 Agricultural challenges and climate change.....	7
2.2 Gender as concept and in the Nepalese Agricultural sector	9
2.2.1 Gender and gender roles: a definition	9
2.2.2 Feminization of agriculture and gender inequalities in Nepal.....	11
2.2.3 Learning and gender	14
2.3 Learning in agricultural development	17
2.4 Study case: SAF-BIN - an action research project	21
3. Aim of the study.....	26
4. Theoretical framework.....	27
4.1 Transformative Learning theory.....	27
4.2 Approaches to women and development.....	30
4.3 Analytical Framework.....	33
5. Methods	34
5.1 Orientation phase	35
5.2 Data collection	36
5.2.1 The problem-centered interview	36
5.2.2 Participant observation	37
5.2.3 Study sites and their agricultural challenges.....	39
5.2.4 Sample	45
5.3 Data analysis.....	47

6. Results and discussion	52
6.1 Description of farmer groups and interview partners.....	52
6.2 Project activities and features of transformative learning.....	55
6.2.1 Dialogue	55
6.2.2 Individual experience	58
6.2.3 Critical reflection.....	61
6.3 Learning outcomes and their impacts.....	65
6.3.1 Instrumental learning outcomes	65
6.3.2 Communicative learning outcomes	71
6.3.3 Learning impacts	74
7. Conclusions & outlook.....	79
 References.....	 81
Annexe	92

List of Figures

Figure 1: Agro-ecological zones in Nepal	3
Figure 2: Analytical framework	33
Figure 3: Methodological design.....	35
Figure 4: Picture of Kalika, Bardiya	39
Figure 5: Map of Nepal, Bardiya district indicated in red	40
Figure 6: Picture of Kaski.....	42
Figure 7: Map of Nepal, Kaski district indicated in red	43
Figure 8: Smallholder farmers in Kalika present the collected data.....	56
Figure 9: Smallholder farmers in Kalika present the wheat trials.....	58
Figure 10: Smallholder farmers test mulching techniques.....	59
Figure 11: A smallholder farmer in Dhikurpokhari in her tomato tunnel.....	60

List of Tables

Table 1: Climate and geographical parameters of the agro-ecological zones of Nepal.....	4
Table 2: Demographic information of the VDCs Kalika and Dhikurpokhari.....	41
Table 3: Number of conducted interviews by gender, region and affiliation.....	45
Table 4: Codes and sub-codes.....	48
Table 5: Gender distribution in smallholder farmers' collectives	52
Table 6: Socioeconomic factors of interviewed smallholder farmers	53
Table 7: Project activities in the study sites	55
Table 8: Instrumental learning outcomes.....	65
Table 9: Communicative learning outcomes.....	71
Table 10: Realized and potential impacts.....	74

Abbreviations

BOKU	University of Natural Resources and Life Sciences
DAWN	Development Alternatives with Women for a New Era
GAD	Gender and Development
GDP	Gross domestic product
FHH	Female headed households
IPM	Integrated Pest Management
NARC	Nepal Agricultural Research Council
SAF-BIN	Strengthening Adaptive Farming in Bangladesh, India & Nepal
SHF-FPDCS	Food production, distribution and consumption system of Small Holder Farmers
SLC	School Leaving Certificate
VDC	Village Development Committee
WAD	Women and Development
WID	Women in Development

Abstract

Smallholder farmers in Nepal are increasingly facing problems caused by climate change. Within the action research and development project “Strengthening Adaptive Farming in Bangladesh, India and Nepal” (SAF-BIN), Caritas collaborated with the University of Natural Resources and Life Sciences (BOKU), Vienna, associated partners from civil society and research as well as smallholder farmers’ collectives to build resilience towards climate change. Based on the Theory of Transformative Learning and theoretical gender perspectives, this study analyzes project activities, outcomes and potential impacts of SAF-BIN in Bardiya and Kaski, Nepal with a focus on gender. Project activities can lead to instrumental (e.g. technical skills and knowledge about farming practices and site-specific technologies) and communicative (e.g. communication skills) learning outcomes, which can result in learning impacts. Through participant observation and 32 semi-structured face-to-face interviews with project participants (16 women, 16 men), qualitative data was collected in 2014. A fieldwork diary and photographs completed the dataset. A comprehensive structure analysis and descriptive statistics were performed using Atlas.ti and Excel.

Results show that smallholder farmers’ collectives differed in most socioeconomic characteristics of their members. In all collectives, more women than men participated though. Especially participative and regular project activities facilitated elements of transformative learning like individual experience, dialogue and critical reflection. Instrumental learning outcomes included: increasing knowledge about climate change and its’ links to farming, new inputs, new cultivation practices, new management approaches as well as diversification and professionalization of farming. Communicative learning outcomes included: enhanced analytical capacities, improved presentation skills and confidence and increased understanding of abstract concepts. Men were more likely to achieve technical learning outcomes, women more likely to achieve communicative learning outcomes due to different gender roles. By including aspects in the project interventions that were not core activities for women before, their capacities were increased. Realized impacts were increased crop production, increasing reflection of gender roles and formation of (saving-)

networks. Possible future impacts are e.g. changing gender roles and resilient farming systems.

More research is needed in order to examine the potentials regarding transformative learning for non-participating farmers and other stakeholders. Also, other socioeconomic factors such as ethnic and caste affiliation plus gender have to be considered in future research in order to explore the potentials of diversity for transformative learning in a detailed way.

Zusammenfassung

Die kleinstrukturierte Landwirtschaft in Nepal ist zunehmend mit Auswirkungen des Klimawandels konfrontiert. Im Rahmen des Forschungs- und Entwicklungsprojekts „Strengthening Adaptive Farming in Bangladesh, India and Nepal“ (SAF-BIN) arbeiten die Caritas und die Universität für Bodenkultur Wien (BOKU) in Kooperation mit Akteuren aus Zivilgesellschaft, Wissenschaft und KleinbäuerInnen, an der Stärkung von Resilienz landwirtschaftlicher Kleinbetriebe im Kontext des Klimawandels. Den theoretischen Hintergrund dieser Studie bilden die Theorie des Transformativen Lernens sowie Genderperspektiven. Darauf basierend werden Lernprozesse und deren Auswirkungen im Rahmen von SAF-BIN in Bardiya und Kaski, Nepal analysiert. Lernprozesse können zu technischen (z.B. Wissen über Anbaumethoden und standortspezifische Technologien) und kommunikativen (z.B. Kommunikationsfähigkeiten) Lernergebnissen führen. Die Datensammlung erfolgte im Jahre 2014 durch teilnehmende Beobachtung und 32 teilstrukturierte Interviews mit ProjektteilnehmerInnen (16 Männer und 16 Frauen). Ein Feldtagebuch und Fotos ergänzten die Daten. Zur Datenanalyse wurden die Systemanalyse und deskriptive Statistik angewandt. Diese wurde durch die Software Atlas.ti und Excel unterstützt.

Die Ergebnisse zeigen, dass die Gruppen sehr unterschiedlich waren bezüglich der meisten sozioökonomischen Faktoren. In allen Gruppen nahmen jedoch mehr Frauen als Männern teil. Insbesondere partizipative und regelmäßige Projektaktivitäten, förderten Elemente von transformativem Lernen wie Dialog, individuelle Erfahrung und kritische Reflexion. Zu den technischen Lernergebnissen zählten: vermehrtes Wissen über den Klimawandel und dessen Auswirkungen auf die Landwirtschaft, neues Wissen über Betriebsmittel und Anbaumethoden, sowie die Professionalisierung und Diversifizierung der Betriebe. Zu kommunikativen Lernergebnissen zählten: erhöhte analytische Kapazitäten, verbesserte Präsentationstechniken und erhöhtes Selbstvertrauen von TeilnehmerInnen. Aufgrund unterschiedlicher Genderrollen erzielten Männer eher technische Lernergebnisse und Frauen erlangten eher kommunikative Lernergebnisse. Da im Rahmen des Projekts auch Aspekte adressiert wurden, die zuvor nicht zu den Kernaktivitäten von Frauen zählten, wurden deren Ressourcen gestärkt. Auswirkungen der Lernprozesse umfassen erhöhte landwirtschaftliche Produktivität,

vermehrte Reflexion von Genderrollen und Netzwerkbildung. Potentielle Auswirkungen umfassen veränderte Genderrollen und resiliente landwirtschaftliche Systeme.

Im Rahmen von zukünftigen Studien könnten die Lernpotentiale für andere Akteure wie ProjektmitarbeiterInnen und KleinbäuerInnen, die nicht am Projekt teilnahmen, genauer untersucht werden. Zudem sollten neben dem sozialen Geschlecht, weitere sozioökonomische Faktoren wie ethnische Zugehörigkeit und Kasten mehr berücksichtigt werden, um die Potentiale von Diversität zu erforschen.

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1. Introduction

Global climatic conditions are changing rapidly, with impacts and risks observed across all over the world in an unprecedented way (IPCC 2014). The impacts of climate change are more severe for disadvantaged people and greater in developing countries (IPCC 2014).

Nepal, an agriculture based mountainous country, is among the poorest countries in the world. With a GDP/capita of 693 US-Dollars, Nepal ranks 167th out of 188 countries (IMF 2013). According to the Human Development Index, Nepal ranks 157 and belongs to the list of Least Developed Countries (UNDP 2013). Especially in rural areas, poverty is high (IFAD 2012). A big part of the population (about 90%) still lives in rural areas and depends on farming as a source of livelihood (IFAD 2009; FAO 2014).¹ Nepal is highly vulnerable to the impacts of climate change (Paudyal & Regmi 2009). Agriculture in Nepal, which is of a subsistence nature and labor intense, is increasingly exposed to the effects of climate change (Westendorp 2012; FAO 2014; IPCC 2014). Especially smallholder farmers in Nepal, with less than 2 hectares of cropland and mostly dependent on family labor, are largely poor with limited access to external resources and increasingly vulnerable to climate change (IAASTD 2009; IFAD 2009; IFPRI 2009; Paudyal & Regmi 2009; IPCC 2014). In Nepal, 93% of operational holdings are operated by smallholder farmers, which have an essential role in securing food for the growing population² (ibid.).

Women are disadvantaged in the Nepalese society and yet play a key role in the agricultural sector (FAO 2014; IFPRI 2013). Female farmers are e.g. disadvantaged regarding the possibilities to climate change adaptation³ because they have less access to resources (FAO 2012; IPCC 2014). For instance, women are less likely to benefit from development programs (ibid.).

¹ At the global level, urban growth rates are much higher than rural growth rates (United Nations Statistics Division 2013; Worldometers 2013; FAO 2014). Kathmandu Valley is with a growth rate of 4% per year, one of the fastest-growing metropolitan areas in South Asia (ibid.).

² While Nepal had a population of around 8 million in 1950, it had grown up to around 28 million in 2013 (Worldometers 2013). It is estimated that the population will increase with an average annual population growth rate of 3.6% in the upcoming years (Worldometers 2013).

³ Climate change adaptation means to build complementary strategies for reducing and managing the risks and impacts of climate change (ibid.).

The aim of the action research and development program *Strengthening Adaptive Farming in Bangladesh, India and Nepal (SAF-BIN)* was to increase resilience towards climate change in order to increase food security for participating farmers.

2. Research context

2.1 Climate, agro-ecological zones and agricultural challenges

2.1.1 Climate

Nepal is a country (around 150.000 km²) in South Asia and has an estimated population of around 27 million in 2012 (United Nations Statistics Division 2013). It is located between India to the South, East and West and China (Tibet) to the North (ibid.).

Nepal is divided into 5 Development Regions⁴ (Eastern, Central, Western, Mid-Western and Far-Western), 14 administrative zones and 75 districts. Further, Nepal can be divided into three, contrasting agro-ecological zones⁵, which are the *Mountains*, the *Hills* and the *Terai* (Pariyar 2005; Tiwary 2005; Gurung et al. 2011; Sinae 2013) (Figure 1, Table 1).

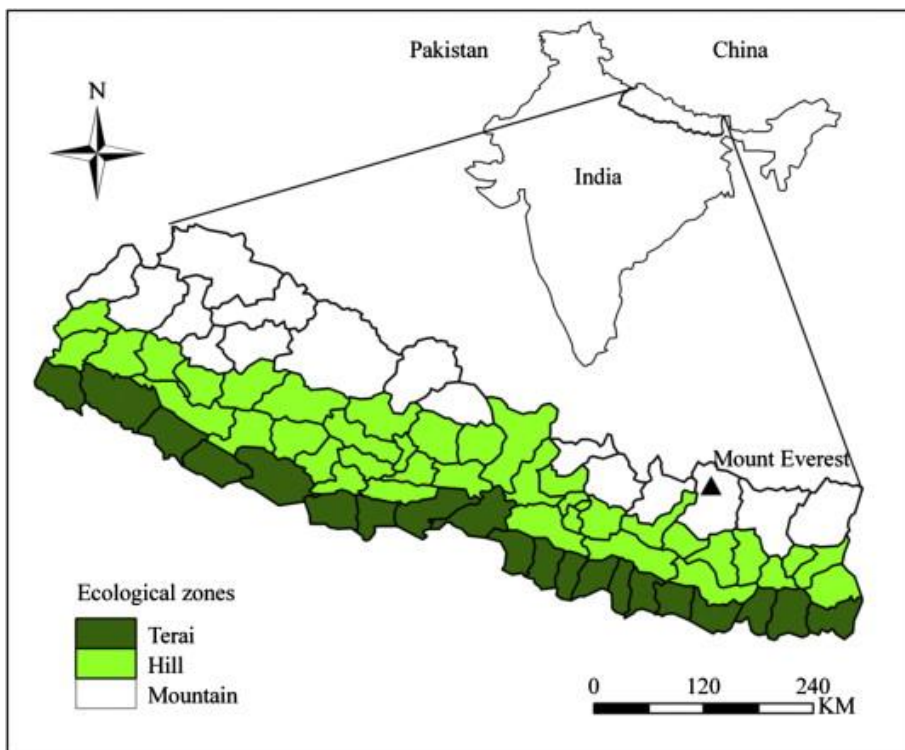


Figure 1: Agro-ecological zones in Nepal

Source: Chhetri et al. 2012

⁴ A Development Region is an administrative division in Nepal. The borders of a Development Region run from the North to South (Subba 2002).

⁵ Agro-ecological zoning defines zones on climatic characteristics, altitude and crop and livestock production systems (FAO 1996).

Table 1: Climate and geographical parameters of the agro-ecological zones of Nepal

	Area (km ²)	Altitude (m)	Average daily temperature (°C)		Annual average rainfall (mm)	Seasonal rainfall distribution (in %)			
			Dec./ Jan.	June/July		March- Mid-June	Mid June- Mid Sept.	Mid- Sept.- Nov-	Dec.- Feb.
Mountains	52000	>2500	n.s.	9 - 10	140 - 900	8-24	72-80	1-9	4-17
Hills	61000	500- 2500	2 - 17	13 - 27	1000 - 2800	2-20	79-92	1-11	2-9
Terai	34000	<500	7 - 24	24 - 41	600 - 1300	4-11	80-98	2-7	2-5

Source: Pariyar 2005

Within short distances, the climate varies from subtropical to cold temperate (Pariyar 2005). Nepal is in the monsoon climate zone. During the summer monsoon (between June and September/October) more than 5000 mm of rain have been recorded in some places (ibid.). Although more than 80% of the annual rainfall takes place during the summer monsoon, there is also pre-monsoon (March and Mid-June), post-monsoon (Mid-September and November) and winter rain, critical for winter crop production (Table 1).

Temperature in the country is highly affected by season, altitude and latitude. Temperature falls slowly during the monsoon and continues to drop as winter starts. Temperature tends to rise from East to West. The highest temperature recorded is 46°C at in Bardiya district and the lowest -26° C in Mustang district (Table 1) (Pariyar 2005).

2.1.2 Agroecological zones

2.1.2.1 Mountains

In the *Mountains*, the climate varies from warm temperate to alpine (Pariyar 2005). The Himalayas are still rising due to the Indian plate pushing towards Tibet, which makes this region seismically active (Westendorp 2013). Because of the rough topography, access to remote areas is difficult and constructing infrastructure expensive (ibid.). Mountains are used for forestry, tourism and agriculture. Due to the

cold climate and the lack of infrastructure, agricultural activities in this area are limited (Gurung et al. 2011). In comparison to other zones, only a small part (5.3%) is cultivated area (Tiwary 2005). At the same time, the majority of the population of the Mountains is farmers. Nearly 45% of the total population in the Mountains are marginal farmers (<0.5 hectares), landless agricultural laborers and sharecroppers⁶ (Tiwary 2005). The average farm size in the Mountains is about 0.68 hectares (Adhikary 2004).

Potatoes, millets and maize are the major food crops, but also barley and buckwheat are cultivated (Pariyar 2005; Tiwary 2005). On a typical farm, one staple crop is cultivated, and beans and vegetables are planted as intercrops. However, at altitudes above 3000m, usually single cropping (usually wheat or barley) is practiced (Tiwary 2005).

Livestock plays an important role and fulfills multiple functions. Herds consist of yaks, chauries (yak-cattle crosses), cattle, sheep, goats and horses. Livestock production is based on crops or crop residues are used as fodder and grazing (Pariyar 2005).

Livestock is grazing seasonally at different altitudes. Pasture at high altitudes is only accessible for grazing in summer. Thus, herds move to lower altitudes during winter (Tiwary 2005). Yaks, however, which are well adapted to the harsh conditions, are staying in higher areas (above 2500m) (Pariyar 2005). They are seldom taken below 2 500 m. Livestock provides milk, meat, fibre and dung. Male yak-cattle crosses are used for transport as well (Pariyar 2005). Wool, goat fibre and woollen products are a major source of income for the local farmers (Gurung et al. 2011).

2.1.2.2 Hills

In the *Hills*, the population density for each unit of cultivated area is the highest of Nepal (Tiwary 2005). Agriculture plays a major role in the economy accounting for more than 90% of the economic activity (Tiwary 2005). The average farm size is by 0.7 hectares (Adhikary 2004). The climate in the predominantly rural *Hills* varies from subtropical to warm-temperate (Pariyar 2005; Tiwary 2005; Allen et al. 2013).

⁶ Sharecropping is a form of agriculture, in which a landowner has an agreement with a tenant. The landowner allows the tenure to use the land in return for a share of the crops, which are produced on the land.

The major cereals are rice maize and millet (Pariyar 2005). Also, potatoes and pulses are cultivated (Tiwary 2005). Further, location-specific cash crops like coffee can be found in the central Hills (ibid.).

The main types of livestock are cattle, buffaloes and goats. Animals graze in forests, on cropland after harvest and on fallows and return to the homestead at night. Besides grazing, fodder resources include crop residues, grass and tree fodder (Pariyar 2005). While cattle and buffaloes are the source of milk, manure and draught power, sheep and goats are used for meat and fibre production. The cultivation of land and transportation are oxen (Pariyar 2005).

2.1.2.3 Terai

In the *Terai*, agricultural land and forests account for most of the land. In this agro-ecological zone, 65% of the population is involved in farming and about 48% are marginal farmers (<0.5 hectares) and agricultural laborers (Tiwary 2005). The average farm size is by 1.26 hectares (Adhikary 2004). The tropical and subtropical *Terai* is the lowland of Nepal and located in the south of the Hills ranging from the Yamuna River (an important confluence of the Ganges) in the east to the Brahmaputra River in the west.

The land is more fertile in the Terai than in the Hills and the Mountains, among other things, due to climatic conditions. Cultivation of this area started only fifty years ago after the eradication of Malaria (Tiwary 2005). The land in the western parts of the Terai is dry, resulting in meagre local food production in these districts (Tiwary 2005; Sinae 2013).

Rice, wheat and maize are the main cereal crops (Pandey et al. 2009). Other crops are barley, pulses, oilseeds, mustard and lentils, jute, cotton and tobacco. The agricultural productivity remains lower than its potential due to technical and social limitations (Tiwary 2005).

Also, livestock plays an important role in the *Terai*. The main livestock species are cattle, buffaloes and goats (Pariyar 2005). Cattle and buffaloes are the source of milk, manure and draught power. Manure is still an important fertilizer although chemical fertilizers have become increasingly important. Dung is also an important fuel. Due to less forests and grazing lands in comparison to the Hills, more crop

residues are fed, and stall-feeding is more widespread. Grazing areas in the Terai include: on roadsides, uncultivated land, in forests, on cultivated land after harvest and on fallows (Pariyar 2005). Similar to the Hills, shortage of feed in winter and before the onset of the monsoon is common (ibid.).

2.1.3 Agricultural challenges and climate change

The agriculture sector in Nepal contributes about 35% to the national GDP (Global Finance 2012; United Nations Statistics Division 2013). Agriculture has always been an important sector, and food production increased rapidly in the 1970s. Factors like the eradication of malaria in the Terai, the construction of infrastructure and land settlement programs contributed to the expansion of farmland and agricultural output (Westendorp 2012). This trend in the agricultural sector did change in the following years. While Nepal was a net exporter of food grain in the 1970s and early 1980s, it has turned into a net importer of food grain since then (Seddon & Adhikari 2003). The demand for food has increased due to a growing population. Agricultural production was unable to keep up with population growth, which resulted in food deficiency for many people (Tiwary 2005; Westendorp 2012). Especially the population in the lowlands is growing very fast (ibid.). Smallholder farmers in remote areas (most districts in the Hills and the Mountains and also in the western Terai) are affected by food insecurity (Seddon & Adhikari 2003; Tiwary 2005). Higher agricultural yields, better markets and infrastructure are needed to achieve food security (Tiwary 2005; IFAD 2009).

Even big families depend on small and fragmented parcels of land. A decline of farm sizes over time has been the overall trend in Asia and the fragmentation in Nepal is continuing because of the inheritance practices (IFAD 2009; Westendorp 2012).

Agriculture in Nepal is especially vulnerable to climate change. In tropical countries such as Nepal, even moderate warming (1 degree C for wheat and maize, and 2 degrees C for rice) can significantly reduce yields because many crops are already at the limit of their heat tolerance (World Bank 2007 in IFAD 2009). As the temperature rises by 3 to 4 degrees, wheat and maize yields are expected to decrease by 20 to 40 per cent, even if farm-level adjustments are made e.g. changing the date of sowing or planting drought-resistant varieties (Long et al. 2007 in IFAD 2009). Also, rice yields would decline, although less than wheat and maize (IFAD 2009). Water scarcity will increase in Nepal due to decreasing snow cover over time, where glacial

melt is an important source of irrigation water (IFAD 2009). Drought, soil erosion, delayed rainfall and increasing extreme events will impact farming activities of smallholder farmers in the region (Slater et al. 2007; IFAD 2009; Westendorp 2012). Consequences of climate change in agriculture are for instance declining productivity growth, migration, increased dependence on imported food, pests, climate-induced disasters and competing demands for water (IFAD 2009; Gurung et al. 2011; Westendorp 2012). The impacts of climate change are usually more severe for smallholder farmers than for large farmers because smallholder farmers have less access to human, social and financial capital (Hazell et al. 2007 in IFAD 2009). For instance, when new technologies require higher capital inputs, small farmers may be at a disadvantage unless they are helped in reducing their transaction costs (IFAD 2009).

Adaptation to difficult climatic conditions is not new for farmers, especially in higher regions. Inhabitants of Nepal have been living for centuries in harsh climatic conditions. Thus, smallholder farmers developed coping strategies and skills. Communities have different strategies to cope with challenges like drought, floods and crop failure, known as 'autonomous adaptation' practices (Gurung et al. 2011).

In the last decade, Nepal has further been subjected to major political changes. Nepal had a civil war from 1996 to 2006 and has become a republic after the end of the monarchy (Westendorp 2012; Sinae 2013). Political disturbances were linked to a lack of access of smallholder farmers to land and less effective land-use in Nepal (Westendorp 2012). Improving the access of smallholder farmers to land is essential for improving production and smallholder farmers' livelihoods (IFAD 2009).

2.2 Gender as concept and in the Nepalese Agricultural sector

2.2.1 Gender and gender roles: a definition

Gender refers to the socially constructed, through cultural practices adopted meaning of being a man or a woman (masculine/feminine), while sex generally refers to the biological sex (male/female/intersex) (de Beauvoir 1949). The category gender inherits inequalities and power relations (de Beauvoir 1949; Bhavnani 2009). This means that social inequalities are a basic subject matter of gender studies (ibid.). On the other hand, gender theories are used to explain social inequalities (de Beauvoir 1949; Butler 2004). Gender relations are social relationships between men and women that determine the distribution of power between them (Oberhuber 2013).

Gender roles vary in different social and cultural contexts. Men and women have multiple roles such as the reproductive, productive, community-managing and community politics role (ITCILO 2013). The reproductive role includes giving birth to children, domestic work and caring for elderly and sick people. It involves taking care of the workforce. Thus, it involves taking care of the partner, oneself, working children and the future workforce (infants and school-going children) (FAO 2013). Women usually hold the mostly unpaid reproductive role (Moser 1993; ITCILO 2013). The productive role is considered to be worth more in society than the reproductive role because it often generates income (Momsen 2004; Tasli 2007). It can be paid or unpaid and includes e.g. working on the field or on the market. Both men and women do this work. Often, men's productive work takes place outside the home (ITCILO 2013).

The community-managing role consists of unpaid voluntary work. It involves providing collective commodities (health care, energy sources and education) and organizing social activities. Women usually fulfill this role. If community management activities are performed by men, they tend to be more visible and of higher social value (Moser 1993; ITCILO 2013).

The community politics role consists of activities mostly undertaken by men. The activities are usually paid, either directly or indirectly through power or status (ITCILO 2013).

Women often fulfil the reproductive role, productive role and community-managing role and thus have a 'triple burden' (Moser 1993).

There is interdependence between gender roles and gender inequalities (Moser 1993; Momsen 2004). Gender inequality means in sociology the differences between genders (Löw & Maathes 2005). Gender differences, also known as gender gaps, appear for instance in the field of health, income, politics and education and are measured for example by the Gender-related Development Index (GDI) and Gender Inequality Index (GII) (UNDP 2015).

2.2.2 Feminization of agriculture and gender inequalities in Nepal

Agriculture in Nepal is characterized by ‘feminization’. Feminization of agriculture means, that more and more women are increasingly engaged in a wide range of agricultural tasks (Bhadra & Shad 2007).

Feminization of agriculture is depicted by women comprising a greater proportion of the agricultural labor force; greater proportion of women engaging in agriculture; women performing majority of the agricultural tasks; and women spending majority of their working hours/time in agriculture (Bhadra & Shad 2007).

The phenomenon of job migration of men and recent political conflicts feminized agriculture in Nepal (Acharya 2003; Bhadra & Shad 2007; Westendorp 2012). On the one hand, out-migration of men for jobs has increased in the last years due to a fragile economic situation (ibid.). Men increasingly migrated to countries of Western Asia, India and Pakistan (ibid.). On the other hand, a decade-long civil war was launched in the 1990s. The conflict claimed the lives of around 17,000 people and displaced an estimated 100.000 people (Peace Direct 2011). Particularly men left the rural areas because they fought in Nepal’s civil war (Westendorp 2012).

As in other countries of the world, people fulfill distinct gender roles in Nepal. Men rather fulfill the productive and the community-politics role, while women rather fulfill the reproductive, productive role and community-managing role (Shrestha 2008; Westendorp 2012). Womens’ productive work is mostly unpaid (Farming First 2013). Shrestha (2008) suggests that the total contribution of women to the Nepalese economy through their unpaid work is about 11.25 billion US\$. This is equivalent to 91.3% of the country’s GDP. The invisibility of unpaid work in public debate contributes to the low social status of women in Nepal and to a ‘feminization of poverty’ (Bhadra & Shad 2007; Shrestha 2008). The employment rate of women to men in paid jobs is very poor (Farming First 2013). For instance, the employment ratio of women to men in the development projects in Nepal at all levels is very poor (head office, regional office, project office) and the presence of women in senior positions and within the technical sector is negligible (Farming First 2013).

Almost exclusively women fulfill the reproductive role in Nepal (Westendorp 2012). 91.7% of Nepal’s women report that they receive no help with their housework, which indicates that the reproductive role is mostly women’s role (Shrestha 2008). There is a difference regarding receiving help with housework between rural and urban

women. Even fewer rural than urban women report that they receive help with the housework (Shrestha 2008). Nepalese men share this view (ibid.). More urban men than women believe that women actually receive help though (ibid.).

Beyond that, women have less -what westerner's call- leisure time than men because women work both outside and inside the household (Giri 2009 in Westendorp 2012). Almost 20% of rural women report having no leisure time at all (Shrestha 2008).

Conventionally, there is a distinct gender division of labor in agriculture in Nepal.

In crop production, men are rather responsible for activities like crop selection, mulching, plant nursery, the application of chemical fertilizer, fungicide and insecticide application, land preparation as well as marketing and sale (Bhandari 2007). Women are rather engaged in activities associated with manuring, sowing and transplantation of seedlings, weeding and irrigation, harvesting, drying of products and storage of products (ibid.). Livestock is women's primal agricultural activity (ibid.). The largest amount of money of women's micro-credit is used for raising livestock, which indicates the importance of livestock for women (Bhadra & Shad 2007). Women tend to have more control over traditional agricultural practices e.g. traditional irrigation practices. Men on the other hand, often take over control if the agricultural production system is commercialized or if irrigation becomes a more capital-intensive endeavor (Bhadra & Shad 2007).

However, due to increasing feminization of agriculture, this distinct gender division of labor in agriculture becomes blurred and women are increasingly responsible for a wide range of agricultural tasks (Bhadra & Shad 2007; Westendorp 2012). In the last years, the feminization of agriculture became apparent in terms of an increasing female share of labor force. According to the FAO (2011), the female share of the agricultural labor force is 65% in Nepal. It is mostly not visible in statistics and an essential factor for securing food (Momsen 2004; FAO 2013; FAO 2014). Furthermore, the working hours of women in agriculture are very high (Bhadra & Shad 2007). Working hours of men and women differ in agriculture in Nepal. While women work twelve or thirteen hours a day, men work only eight or nine hours a day, depending on the season (Giri 2009 in Westendorp 2012). The fact that women have the variety of tasks and roles leads to an extensive workload (ibid.).

Although women have an extensive workload and a lot of responsibilities in agriculture, they have less access to education, inputs and technologies in Nepal (FAO 2014). Further, women have less land rights, as well as less access to credit and markets in Nepal (FAO 2014). Especially women from the Mid-regions and Far-west regions of Nepal remained excluded from access to services and economic opportunities in the past (Bhadra & Shad 2007). The Population Census revealed that women have ownership of the house, land and the livestock in their families only in 17% of the households, although they fulfill a big bulk of the work associated with the house, land and livestock (CBS 2002). According to Agricultural Census (2001/02), women own 8% of the total landholding. Women own only around 5% of the total cultivated land (CBS 2004).

At the same time, the exclusion of women from political participation and decision-making processes on various levels keep women from escaping from poverty (Westendorp 2012).

A problem associated with the feminization of agriculture is that female-headed households are on the rise mostly in rural villages (Tasli 2007; Gartaula 2011). Female-headed households are households, in which the husband is either divorced, dead or absent for a longer period because of job migration (Tasli 2007). Female-headed households are subsistence oriented and mostly associated with poverty and in Nepal (Momsen 2004). Members of female-headed households have a lower literacy and educational status, smaller land holdings and they lack access to information (Acharya 2003).

Thus, women and especially women of female-headed households have an extensive workload and at the same time fewer rights and fewer chances. Through education and learning, challenges associated with gender inequalities can be addressed (FAO 2014).

2.2.3 Learning and gender

Education and learning is regarded as a key to address challenges associated with gender inequalities and resilience towards climate change (FAO 2014; UNESCO 2014). Numerous studies highlight the potentials of learning within participatory development approaches regarding gender issues worldwide and in Nepal (IITA 2010; Duveskog et al. 2011; Westendorp 2012; Najjar 2013). Through participatory development approaches, learning outcomes and learning impacts regarding gender can be achieved. Stanford University (2010) states that “outcomes” refer to the observed effects of the activities on the participants. Thus, learning outcomes can be described as what was learned due to learning activities. “Impacts” are the degree to which the outcomes observed are attributable to the activities (Stanford University 2010). Thus, learning impacts are changes, which result from the project activities and its outcomes.

Gender inequalities can be addressed directly and indirectly. Addressing gender issues in a direct way within participatory development approaches involves discussing about gender issues. Discussions about gender issues lead to increasing awareness about gender inequalities, which is the basis of reducing the same (Najjar 2013; FAO 2013).

Further, learning within participatory development approaches can influence gender inequalities in an indirect way. Participatory development approaches can also affect and change the participants view on what it means to be a man or a woman through common action and dialogue (Duveskog et al. 2011; Najjar 2013). Further, participatory development approaches can lead to increasing women’s confidence and increasing technical skills e.g. in the field of cultivation practices (Fawcett & Regmi 1999; Farming First 2013; Oberhuber 2013). Increased confidence can enable women to become more adept in securing their livelihoods and in fostering positive relationships with community members and thus empower women (Duveskog et al. 2011). For instance, participants of a participatory development program in Nepal developed their leadership skills which lead to an increase of women at leadership positions (Gautam 2004). Momsen (2004) shows that development programs can also lead to an increase in womens’ workload. Thus, a context specific implementation is essential for improving women’s’ livelihoods (ibid.).

Although there is a range of learning outcomes and impacts within participatory development approaches, Najaar (2013) notes that there are few learning outcomes beyond the participants, which indicate that there is still a great in learning beyond the participants. Because farmers are in contact with other members of the community, it could be assumed that also non-participants learn from participatory development approaches.

Studies show that there were notable gender differences in learning outcomes and impacts within agricultural development in the past worldwide and in Nepal (Westendorp 2012; Najaar 2013). Najaar (2013) explored learning outcomes in Kenya in a participatory development project and showed that men rather learned about deep tillage, storage of pests and pesticides, beekeeping and how to reach consensus (ibid.). Women learned about the construction of terraces, and how to speak in front of a crowd (ibid.). Further, learning outcomes of men were an increased knowledge of concepts like farm labor and hunger (ibid.). Women were more focused on private issues, while men rather focused on public issues (ibid.). Gender differences in learning outcomes occur on the one hand due to different gender needs and “interests” that result from different gender roles (Moser 1993; ITCILO 2013). On the other hand, learning differences result from unequal access to resources (Farming First 2013; Najjar 2013).

Women are often not included in development programs. Worldwide, female farmers receive only 5% of all agricultural extension services; only 5% of the world’s extension agents are women and only 10% of total aid for agriculture, forestry and fishery goes to women (Farming First 2013). There are still cases, in which women with no land and low social status (single mothers, widows and divorces) are excluded from development projects (Najjar 2013). Also in Nepal, women and especially women with a very low social status are often not included in learning programs in development (Westendorp 2012). Gender-sensitive learning environments aim to facilitate the access to resources for men and women. A gender-sensitive learning environment does not necessarily mean equal numbers of women and men in the activities (IITA 2010; Lau & Yuen 2010). However, it particularly involves equal access to resources, the analysis of learning activities and its impacts regarding gender inequalities (IITA 2010). Mixed-group approaches regarding different genders can lead to a fruitful environment where power and status differences are likely to be erased through discussion and reflection (Duveskog et al.

2012). More research is needed to explore how all participants of development programs (farmers, facilitators and scientists) can enhance gender equality through participatory development approaches (Najaar 2013).

Through learning within participatory development approaches, challenges associated with gender inequalities can be addressed. Unequal access to resources and potential unequal learning outcomes and impacts can reproduce gender inequalities. Thus differences in learning processes have to be considered.

2.3 Learning in agricultural development

Approaches in development projects are subject to a historic shift. In the second half of the 20th century, approaches in development projects focused on the *Transfer of Technology (ToT)* (Percy 1999). Inputs and technical knowledge were transferred from Western countries to developing countries respectively from extension agents to farmers, aiming to increase agricultural productivity and living standards (IITA 2010).

This approach subscribed to modernization theory, which guided the development establishment in the 1950s and 1960s and assumed that development is a linear process of progressive transition. Western values were emphasized and individuals as the catalysts for social change targeted (Duggan et al. 2006). Extension agents used to pass on technologies to relatively privileged farmers, often through a *Training and Visit (T&V)* extension system (Percy 1999). The World Bank introduced T&V during the 1980s and 1990s, and its structures were often rather hierarchical (IITA 2010). Farmers acted as passive recipients while extension agents acted as providers of knowledge. Local knowledge or indigenous practices were mostly not taken into account and projects were conducted in a rather short period (IITA 2010). Benefits have not spread to other farmers as it was envisaged in the Diffusion of Innovation theory (Chambers 1993; Rogers 1995). Social factors like cultural differences or social inequalities restricted the application of transferred technologies (Miller et al. 2010). The approaches have especially not served the majority of smallholder farmers (Sperling & Ashby 1997). Particularly poor women have benefited little from such extension services and in many cases have been even further marginalized (Chambers 1997). Besides, various authors found ToT unsuitable for agricultural extension due to the complexity of farming systems (Tittonell et al. 2005; Berg & Jiggins 2007). Due to these restrictions, the need for alternative knowledge generation, distribution and creative ways to overcome social limitations arose.

The response was a focus on participatory development approaches that are nowadays widely accepted in development practice (Duveskog & Friis-Hansen 2009; IITA 2010; Najaar et al. 2013). Participation can be defined as taking over responsibilities and taking part in decision-making processes (Bliss & Neumann 2007). It also means to give disadvantaged people control over resources, access to services and bargaining power (Van der Heck 2003).

A participatory activity starts with participatory planning, which is an effort of the parties involved to elaborate a common agenda for future development actions (FAO 2015). The farmer is at the center of decisions on the type of measure that will benefit him or her (Percy 2005). Hierarchical structures are avoided. The extension agent is a facilitator of the learning activities rather than an expert and farmers are not being seen as recipients or adopters anymore (ibid.). An analysis of two participatory action research projects in rural Iran show that achieving authentic participation and communication requires patience, commitment and sacrifice on the part of action researchers (Kamali 2007). Local knowledge and indigenous practices are taken into account. All stakeholders should be recognized in the generation and dissemination of knowledge (IITA 2010). Participatory approaches are bottom-up approaches focusing on formal and informal learning as well as the empowerment of the participants (Duveskog 2006; Duveskog & Friis-Hansen 2009; European Commission 2014). Through a focus on critical thinking skills, farmers' self-reliance should be increased which enables them to react better to increasing challenges (Berg & Jiggins 2007).

The first participatory development approaches were implemented by the Food and Agriculture Organization (FAO) in Southeast Asia in 1989 as a reaction to problems associated with the green revolution (Westendorp 2012). Farmer Field Schools⁷ were implemented in Indonesia to deal with widespread pest outbreaks in rice by using Integrated Pest Management. In 1997, FFSs were introduced in Nepal but only in 2002, women had the first formal trainings in agriculture in the context of FFSs. Westendorp (2012) admits challenges that FFSs were facing in Nepal, such as the exclusion of people with a low social status.

I realized that, despite my assumption that all farmers had an equal chance to participate in FFS, the majority of the poor, the untouchables or Dalits and Janajatis, had been excluded from FFS (Westendorp 2012, p.5).

⁷ Duveskog et al. (2012) defines Farmer Field Schools as "(...) a community-based, farmer-generated and facilitated non-formal approach to adult education that provides a collective institutional platform where farmers meet regularly in mixed groups to study the 'how and why' of farming."

Participatory approaches have also found its way in research. *Participatory Action Research*, with participative constructivism as the core concept, places an emphasis on cooperation between researchers and those concerned (Gustavsen 2014). Participation can result in acceptance and adoption of new practices and varieties (IITA 2010; Gustavsen 2014).

The intended change in an Action Research project involves re-education, which refers besides learning new skills, to changing thinking patterns and action. These patterns of thinking and actions are established at the individual and group level. Change is typically intended at the level of norms and values and expressed in action (Sage 2004). Action Research is increasingly applied within development projects. Participatory Research and Extension is often seen as a key in promoting improved agricultural technologies (IITA 2010). Participation of local stakeholders is encouraged. Local communities are involved in the whole process from analyzing their situation to evaluating new technologies. Through farmer-to-farmer extension the likelihood of the adoption of innovations is increased (IITA 2010). Participatory Action Research in development can also change the attitudes of rural extension workers and bureaucrats towards a more participatory decision-making process (Kamali 2007).

In the learning process, learners interact with the context of physical space, structures and institutions (Wu & Wu 2015). This interaction is the key to learning (John-Steiner & 1996; Rogoff 1995 in Wu & Wu 2015). Interactions with the context can be facilitated through tools like the provision of resources by the organization (e.g. in the form of exposure visits). Exposure visits are a proven tool in development and provide an interactive learning environment (INAFI 2005).

Adult learning is a personal process that has to be understood in the context of the phase of life and the society in which the adult lives (Baumgartner et al. 2007). Human behavior is shaped by social, cultural, structural and personal factors (sociocultural approach to learning)⁸ (Baumgartner et al. 2007). Personal factors such as gender, motivation and socialization including education, influence how and what adult learners learn (Wu & Wu 2015).

⁸ A sociocultural approach to adult learning combines individual and contextual perspectives, emphasizing that learning is influenced by the context of adult life and the social and cultural features (Baumgartner et al. 2007; Wu & Wu 2015).

Najaar (2013) explored learning outcomes in Kenya in a participatory development project. Her results show learning outcomes were mainly achieved by practical application and training of the skills and knowledge, observation and dialogue.

2.4 Study case: SAF-BIN - an action research project

The subject of this study was the research and development project *Strengthening Adaptive Farming in Bangladesh, India & Nepal* (SAF-BIN) funded by the European Union Global program on Agricultural Research for Development (ARD). Within SAF-BIN, a multi-dimensional research project, agricultural development challenges in the context of climate change were addressed. For instance, local food and nutritional security were promoted through adaptive small-scale farming in four rain-fed Agro-Ecosystems (AES) areas that are located in three countries in South Asia namely Nepal, Bangladesh and India (SAF-BIN 2011).

Stakeholders of SAF-BIN

SAF-BIN was based on the collaboration of a variety of project partners and stakeholders. The applicant was Caritas Austria. Caritas Austria worked together with Caritas India, Caritas Bangladesh, Caritas Nepal, BOKU University (project partners) and associated partners⁹. Among others, further stakeholders comprise of the Nepal Agricultural Research Council (NARC) and policy makers at different levels in the respective countries (SAF-BIN 2011).

Target groups and action locations of SAF-BIN

Activities of this research and development project have taken place over a period of 60 months. Overall, it was planned that about 3000 smallholder farmers in about 90 different villages (30 villages per country) participated in the project. In Nepal, it was planned initially that about 1000 smallholder farmers participated in the project activities in 30 villages located in four districts namely: Kaski, Nawalparasi, Bardiya and Surkhet district.

In Nepal, 1322 smallholder farmers in 28 Village Development Committees (VDCs) located in the four districts participated in the SAF-BIN project. VDCs are the smallest administrative units in Nepal. In each VDC, three to four smallholder farmers' collectives were formed (Kaski: 30; Nawalparasi: 30; Bardiya: 18; Surkhet)

⁹ Associated partners are: Action for Food Production (AFPRO), Sam Higginbottom Institute of Agriculture, Technology & Sciences (SHIATS), Bangladesh Rice Research Institute (BRRI) and Local Initiatives for Biodiversity, Research and Development (LI-BIRD).

(SAF-BIN 2011). The districts were selected by SAF-BIN after interactions with local stakeholders. Following aspects have been considered in the selection of VDCs and smallholder farmers' collectives:

- Diversity in climatic zones: tropical & subtropical zones were included
- Geographical setting which includes regions Terai, Hills and Mountains
- Diversity in rainfall patterns: high, moderate and low rainfall areas
- Cropping diversities including: maize, millet, rice
- Reliance on rain-fed conditions
- Socio-economic set up: inclusion of marginalized groups

A focus was on the inclusion of marginalized groups such as people from disadvantaged castes and ethnic groups such as female-headed households. The project locations within the districts Bardiya, Kaski, Surkhet and Nawalparasi were selected after interactions with the District Development Committee, District Agriculture Development Officers and other local stakeholders including agricultural scientists and locals. The suitability of the location was evaluated by conducting exploratory visits to the sites.

Objectives and estimated results of SAF-BIN

SAF-BINs overall objective was to:

Promote local food and nutritional security through adaptive small scale farming in four rain-fed Agro-Ecosystems (AES) areas in South Asia in the context of climate change (SAF-BIN 2011).

In addition to this, specific sub-objectives have been defined. Innovations in traditional food production, distribution and consumption system of smallholder farmers (SHF-FPDCS) were screened and documented with respect to climate change adaptation, mitigation and nutritional security (ibid.). Innovations in food production refer to crop diversification, integrated resource management and innovative cropping practices. SHF-FPDCS models were designed through blending traditional practices and modern innovations for their abilities to adapt to climate change, mitigate climate change effects and ensure nutritional security. Potentials of the SHF-FPDCS models designed were further tested together with smallholder

farmers' collectives for their efficiency, sustainability and local acceptability (ibid.). Smallholder farmers' institutions around locally important food production systems were created and strengthened (ibid). The project objectives were pursued with a focus on gender, cultural identity and equity to achieve a maximum benefit for marginalized smallholder farmers and their communities (ibid.).

The expected project results were improved productivity, diversification and enhanced capacity of farms to adapt to climate change and enhanced food and nutritional security of smallholder farmers in the context of climate change. Estimated results were further to increase the use of innovations in rainfed SHF-FPDCS, to enhance appreciation of cross-cutting issues affecting climate change and food security and to achieve partnership and dialogue among smallholder farmers' collectives, civil society, agriculture research and extension agencies and policy makers (ibid.).

Main activities of SAF-BIN in Nepal

The programme launching workshops in 2011 in India constituted the official start of the programme. Plans to initiate the project at country level were developed. Afterwards, preparation activities like team recruitment, team orientation and national project launching workshops took place at the country level. The selection of villages, student researchers and the development of the project operational manual took place. The operational manual was revised in consultation with the partner organisations and translated into the local languages by the partners (SAF-BIN Annual Report 2012).

Subsequently, execution activities have been carried out (ibid). A baseline survey has been conducted by SAF-BIN in the VDCs to understand the situation smallholder farmers are facing. Also, smallholder farmers' understanding of climate change and its impacts in general have been assessed. At the community-level, qualitative and quantitative data was collected using tools such as participatory rural appraisal¹⁰, stakeholder meetings and household surveys.

¹⁰ Participatory Rural Appraisal is an approach used by organisations involved in development activities. Knowledge and opinions of the local community in the management of development projects should be incorporated (Krummacher 2004).

Participatory appraisal of SHF-FPDCS was conducted during the first year in all 90 villages with various participatory rural appraisal tools. Village level workshops were conducted for validation of the collected information (SAF-BIN Annual Report 2013).

Secondary review of SHF-FPDCS expanded the data sources. Secondary reviews were being done at local, national and regional level. They involved literature reviews, visits to institutes, department and government offices to collect data and consult with scientists. The research collaboration with national and international students was an integral part of this activity (SAF-BIN Annual Report 2012; SAF-BIN Annual Report 2013).

Based on the gathered information, smallholder farmers' collectives were formed and areas for further research identified. Smallholder farmers have been selected through village level workshops involving local stakeholders. Also, a two-day farmer's orientation has been conducted for the selected smallholder farmers. The smallholder farmers' collectives are the main focal point of all SAF-BIN activities. In the context of the project, the activities involved the participation of farmers in on-farm adaptive research to increase adaptation to climate change.

Local innovations and traditional practices were screened and documented in traditional food production, distribution and consumption systems of smallholder farmers. Some practices were selected and blended with innovations for the design of models. Some became candidate models which were further tested together with smallholder farmers' collectives. Based on the comments and suggestions of the SHFCs, the models were refined, adapted and evaluated annually. The innovation and practice scouting was repeated after every season with the groups activity (SAF-BIN Annual Report 2012; SAF-BIN Annual Report 2013).

Trial plots were established to perform on farm trials. Farmers were ready to use part of their farmland for the establishment of these plots. The smallholder farmers' collectives established and monitored the trial plots, collected data and analyzed the results within the groups (on-farm adaptive research).

Resource centers in the project regions were installed that supported on-farm adaptive research and provided smallholder farmers and project staff with resources. Their main function is the provision of information to project farmers and rural communities and they serve as administrative units for resources and inputs.

Further, multi-stakeholder forums in the districts aimed to support network-building. Additionally, there were national/district-level meetings that were carried out at a monthly basis for better planning and implementation of activities. These meetings also support network-building. Also, SAF-BIN conducted capacity building activities for the Caritas staff and the smallholder farmers.

Additionally, capacity building initiatives such as trainings and exposure visits for Caritas staff and smallholder farmers e.g. to research stations, have been carried out.

Operational structure of SAF-BIN in Nepal

The Programme Manager managed the program on a country level. The National Programme Coordinator in Nepal was responsible for the coordination of the project activities. Further, a National Research Officer and a Financial Officer were recruited at national level. The National Research Officer was in charge of all research related aspects. The Financial Officer was in charge of the management of the projects' financial resources.

At district level, the District Project Officers administer and manage project activities. Village Research Assistances administer and manage project activities in the different VDCs. Research officers are mainly entrusted with the tasks of completing the secondary review of SHF-FPDCS like review of literature and the consultation with scientists (SAF-BIN Annual Report 2012). They were also responsible for the facilitation of all aspects related to on-farm adaptive research and supported student researchers in their field work (ibid.)

3. Aim of the study

The goal of this research is to make a contribution to the overall goal of the SAF-BIN project, which is to promote local food and nutritional security through adaptive small-scale farming in rainfed AES in Nepal in the context of climate change (SAF-BIN 2011). The purpose of the research is to provide the project stakeholders with reliable and valid information on project activities, their outcomes and potential impacts in the selected project regions. It aims to provide a reliable picture of the current state of the learning processes of men and women.

Thus, following research questions are formulated:

Research question 1 - Gender-focused project activities:

In which ways do the activities conducted allow learning within SAF-BIN project for men and women?

Research question 2 - Learning outcomes:

Which communicative and instrumental learning outcomes are realized by the SAF-BIN project?

Research question 3 - Gender-focused learning outcomes:

In which way do these learning outcomes differ between men and women?

Research question 4 – Potential learning impacts:

Which impacts are realized by the SAF-BIN project that result from the learning outcomes?

Because the study is conducted in the middle of the project duration, long-term impacts, which are hard to measure, can only be anticipated.

Within the research, a gender analysis of the project activities taking place within the SAF-BIN project is conducted. The analysis from a gender perspective allows a better understanding of gender differences concerning project activities and learning outcomes. In consequence, the results of this research will help similar actions, pursuing an action research and development approach, to plan and implement gender-sensitive project activities.

4. Theoretical framework

In order to analyze the project activities and outcomes within SAF-BIN, relevant domains of the Theory of Transformative Learning were identified and translated into indicators. To cover gender differences in learning, gender perspectives were integrated.

4.1 Transformative Learning theory

The transformative learning theory, which is one of the most established theories of adult learning, defines specific principles and conditions which allow transformative learning (Taylor 2007; Taylor 2009). It is often applied as a framework for empirical studies, e.g. (Duveskog 2006; Najaar 2014).

Transformative learning is a process, during which learners transform or expand their presumptions (Mezirow et. al 2009). Transformative learning can be purposefully attained through specific elements in a learning setting. It can also result from a transformative experience, which is described as a “disorienting dilemma” e.g. a personal life crisis or series of smaller issues (ibid.). In the context of this study, climate variability, drought, low soil fertility or low productivity are examples of such a transformative experience (Percy 2005).

The theory posits two kinds of learning domains: *instrumental* and *communicative learning* (Mezirow et al. 2009). *Instrumental learning* is about learning to control, manage or change one’s environment and about learning how to achieve desired ends (Mezirow et al. 2009). This involves for example to learn how to use and interpret experiential or empirical methods (Najjar 2013). In the context of this study, instrumental learning is related to gaining technical skills and knowledge about farming practices and site-specific technologies, as well as understanding cause-effect relationships. *Communicative learning* involves the ability of abstract conceptualization (Mezirow et al. 2009). Learners are engaged in negotiating meaning, values and ideals actively (Najjar 2013). In the context of this study, communicative learning is related to gaining communication skills and analytical capacities, as well as understanding new concepts. Mezirow et al. (2009) remarks however, that instrumental and communicative learning are not entirely separable but rather feed into another (Mezirow et al. 2009). The relationship between the two

domains of learning continues to challenge researchers and is underdeveloped in transformative learning theory (Taylor 2007; Najaar 2013)

Transformative learning is more likely to take place under ideal learning conditions. This involves that accurate and complete information is available and that freedom from coercion, openness to others' points of views and equal opportunities to participate exist (Mezirow et al. 2000). A safe environment for learning can facilitate transformative learning (ibid.). Within ideal learning conditions, smallholder farmers are more likely to find innovative farming solutions, adopt more productive technologies, become political leaders and break oppressive relations with middlemen (Duvestog et al. 2009). In the learning conditions, the facilitator can stimulate aspects of individual experience. Through participatory activities, individual experience can be supported (ibid.).

The learning conditions should allow key elements of transformative learning. These key elements have an interdependent relationship and one element can function as a precondition for the other element (Taylor 2009). The focus is here on three elements of the theory: dialogue, reflection and individual experience. Individual experience „consists of what each learner brings (prior experience) and also what he or she experiences within the learning setting” (Taylor 2009). Critical reflection addresses the question in which way reflection of the learners is promoted. Reflection is divided into three aspects: the reflection *content*, *process* and *premise* (ibid.). Reflection content addresses *what* we perceive, think, feel and why we act the way we act. Reflection process addresses *how* we perceive. Reflection premise addresses an awareness of *why* we perceive (ibid.). Critical reflection also involves becoming aware of oppressive structures and taking action to overcome these structures.

Critical reflection [...] refers to questioning the integrity of deeply held assumptions and beliefs based on prior experience (Taylor 2009, p.7).

The element dialogue addresses the question in which ways communication with others is possible in a specific context.

Dialogue is the essential medium through which transformation is promoted and developed (Taylor 2009, p.9).

Dialogue means rational discourse. It means

[...] that special kind of dialogue in which we focus on content and attempt to justify beliefs by giving and defending reasons and by examining the evidence for and against competing viewpoints [...] (Mezirow 1994, p. 225)

The theory of transformative learning evolved over time and is based on constructivism (Kitchenham 2008; Taylor 2009). Over the past decade, further important principles were defined such as holistic orientation, awareness of context, authentic practice and learner-centered teaching. The teacher is seen as a facilitator. His or her role is to balance power relations through shared decision-making and ongoing evaluations (Cranton 2006; Cranton & Taylor 2013).

Contemporary development practice and transformative learning practice share similarities of goals and conditions (Percy 2005; Taylor 2007; Duveskog & Friis-Hansen 2009). The participatory and process-oriented character is integral to action research, development and transformative learning. Participatory action in development entails communicative learning through activities focusing on partnership, collaboration, dialogue, social- and co-learning, conflict management and reaching consensus (Najjar 2013). Reflection and rational discourse should be promoted in action research. The constructive dialogue is essential e.g. for experimenting, discussing problems and outcomes. The transformative learning theory can be useful for understanding shifts within roles of extensionists from experts to learners and facilitators of knowledge (Taylor 2007). There has been limited research to understand the transformative potential of participatory research and extension (Duveskog & Friis-Hansen 2009; Duveskog et al. 2011). Participatory research and extension is an opportunity for understanding learning not only at the individual but also at the collective level (Percy 2005).

While the theory offers a comprehensive framework and serves as a good basis for empirical analysis, it also has weaknesses. Ettling (2006) indicates that the educational experience is never unbiased. The educator has a theoretical orientation and thus influences learning process (Taylor 2009 in Ettling 2006). Taylor (2007) alludes to the fact that the context of application influences learning (Taylor 2007).

4.2 Approaches to women and development

The study of women and development processes is located at the intersection of development studies and women studies, which both represent a complex of disciplines and deal with roots and forms of inequality (Duggan et al. 2006). As social and economic theories on development shifted over time, also perspectives on women, gender and development have changed.

Rathgeber (1990) identifies three distinctive theoretical paths in the fields of women studies and development studies: *Women in Development* (WID), *Women and Development* (WAD) and *Gender and Development* (GAD) (Rathgeber 1990).

Women in Development (WID)

This approach emerged in the 70s and subscribes to the assumptions of modernization theory (Rathgeber 1990; Duggan et al. 2006). Liberal feminists supported the argument that traditional societies are rather authoritarian and male-dominated (Duggan et al. 2006). Progressive feminists criticized the characterization of women in developing countries as biased due to the idealization of western values (Duggan et al. 2006).

In the 70s, the call for gendered perspectives in development increased. The Danish economist Ester Boserup (1970) showed the negative impact of colonialism and modernization on development. As a result, work concepts that excluded women's labor and undermined the status of rural women were redefined (Boserup 1970). Boserup (1970) also showed that development processes affect men and women differently and that women were actually marginalized due to the lack of access to technology and resources after a decade of development programming (ibid.). She demonstrated that women's agricultural production was crucial for the local and national economies, which served as a main argument to integrate women into development processes (ibid.). In developing countries in general and also in Nepal, the bulk of the workload in household and farming is carried by female farmers (Westendorp 2012).

Women and Development (WAD)

Increasing studies in the field of development and women, emerging critique of WID and a general shift in the discourse, lead to the emergence of *Women and*

Development (WAD) in the second half of the 1970s. WAD is linked to the dependency theory, with its basic assumption that the *periphery* (disadvantaged region) will develop only when freed from its links with the *center* (advantaged region) (Duggan et al. 2006). It was argued that women have always been part of development processes, thus the need for the integration of women in development processes was a myth (ibid.). The focus of WAD was on the relationship between women and development processes and the nature of the exploitation of women (and men) through multinationals. This approach called for structural changes in development programs to improve women's and men's lives. Women were accepted as important economic actors sustaining societal structures. Not only the public, but also the private sphere of women's occupational roles was taken into account. However, WAD did not question the gender roles and thus failed to analyze the relationships between patriarchy, differing modes of production, women's subordination and oppression (ibid.). WAD primarily dealt with women's productive roles, at the expense of their reproductive life (Rathgeber 1990). Westendorp (2012) addressed the importance of looking at both – women's occupational roles outside and inside the home and to address further categories of inequality like class division.

Gender and Development (GAD)

This approach arose in the 1980s from a call for an alternative to the WAD approach. It was influenced by socialist feminist thinking and was a confluence of diverse feminist perspectives (Duggan et al. 2006). It offered a broader perspective by looking at diverse aspects of women's lives. Social relations between men and women in both the labor force and the reproductive sphere were addressed (ibid.). It rejected the public/private dichotomy and emphasized the importance of upsetting existing power relations between men, women and across social classes (Rathgeber 1990). It stressed the need for women to organize themselves for a more effective political voice (ibid.). The GAD approach emphasized the critical role of the state to initiate equality between sexes (Duggan et al. 2006). Duggan et al. (2006) addressed that the diverting understanding of development is crucial in these different approaches. While the former approaches understood development rather as a discrete state, GAD tried to take the complexity of development into account.

In the 1990s, the theory of practical and strategic gender needs was established. It was first developed by the sociologist Molyneux (1985) and later adapted by Moser

(1993). Molyneux used the categories gender needs and gender interests while acknowledging the heterogeneity of women worldwide (Molyneux 1985). Based on Molyneux thoughts, Moser introduced gender planning frameworks in the 1990s that considered different roles of women and men, the triple burden of women (reproduction, production and community management) and women's practical and strategic needs. Practical gender needs are short-term needs which relate to basic needs such as health, income, while strategic gender needs are long-term needs regarding education, subordination etc. (Moser 1993). Moser (1993) argued that besides the heterogeneity of women worldwide, a simplification of women is necessary in order to implement gendered planning practices. Gender planning got more and more institutionalized. Strengthening resources of women through the consideration of gender needs and gender interest is seen as the key to economic and political empowerment by Moser (1993). Although Moser has the same concern as DAWN (empowerment of women and the consideration of needs of 'Third World feminists') she uses a top-down approach. She is, in contrast to DAWN, convinced that an intervention of development planners is necessary to empower Southern women. Moser argued that in order to implement gender planning effectively in complex contexts, a homogenization of women is necessary (Moser 1993.). This argument was criticized harshly by DAWN feminists, who demanded respect for diversity (Kerner 1999).

In the past years, post-structural feminism gained importance, which emphasized the social construction of gendered subjectivities and the discursive nature of identities (Butler 2004). It is argued that gender differences are socially constructed and that the focus on differences can even lead to more inequality (ibid.). An important contribution of this approach was the assumption that there is not a universal category of "woman" or "man" and the identification of intersectionality of e.g. sex, race, ethnicity, class, health, sexuality, nationality (Crenshaw 2004). Because gender is never the only factor that determines a person's identity, Momsen (2004) states that it is crucial to consider gender in the context of other cross-cut issues like class, race, age etc.

4.3 Analytical Framework

The analytical framework of this study includes categories of transformative learning theory. The gender perspective (cf. chapter 4.2) is applied to look at learning processes (project activities, outcomes and impacts) through „gendered glasses“. Figure 2 gives an overview of the analytical framework of this study:

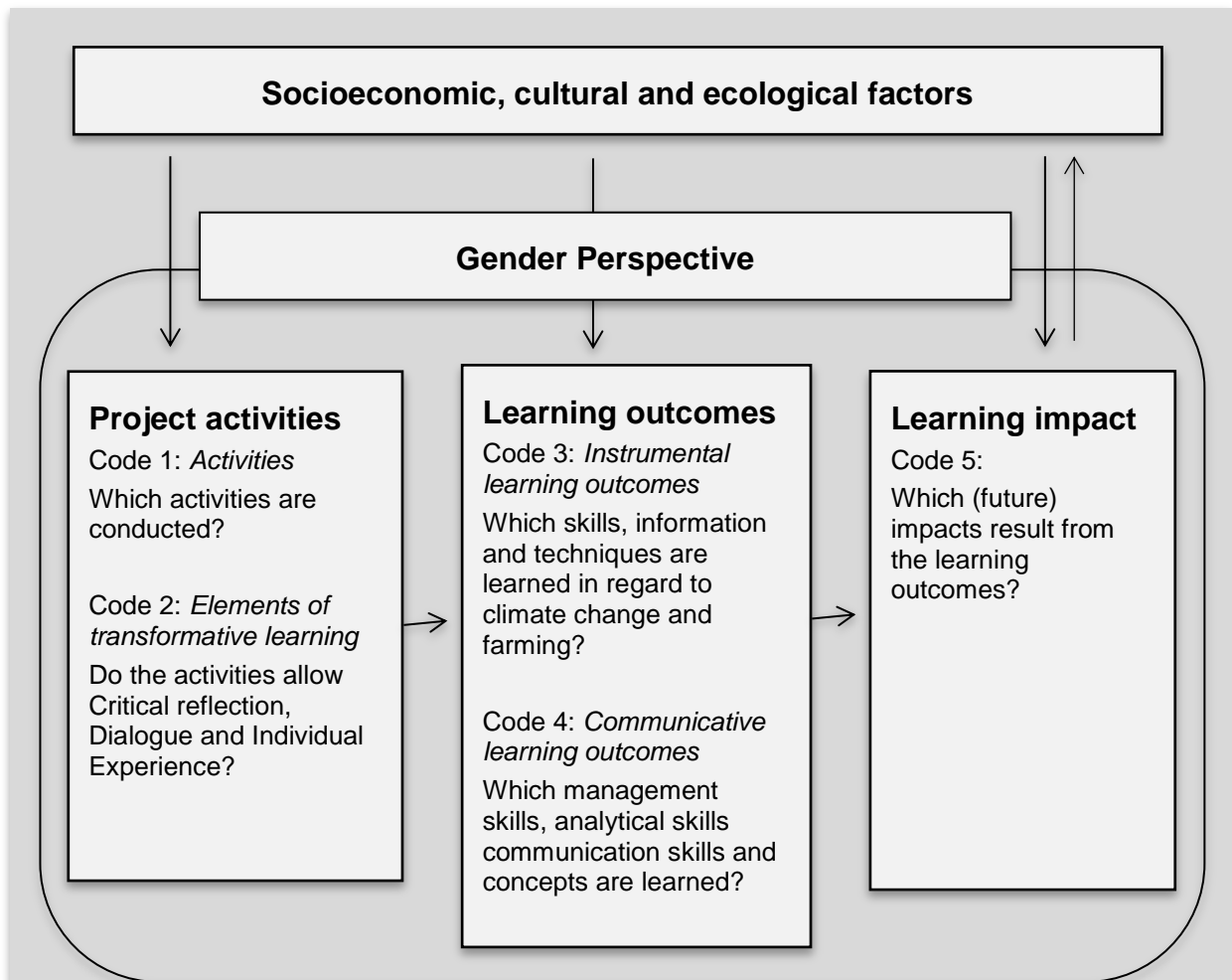


Figure 2: Analytical framework

Source: Own illustration

5. Methods

The research questions have been explored by using a qualitative research design. Research methods were the problem-centered interviews and participant observation. By using qualitative methods, the understanding of the field should be deepened (Lueger 2010; Atteslander 2008). Qualitative research approaches are based on the theory of radical constructivism. It assumes that reality is constructed through social definition-processes (Lueger 2000; Lueger 2010). Qualitative methods used in this study rely on following basic principles (Lueger 2000; Atteslander 2008; Froschauer & Lueger 2009; Lueger 2010):

Communication: Communication as the basic principle, involves verbal and non-verbal communication.

Openness: Openness, describes the required open attitude towards the field of interest.

Problem- oriented & process-oriented character

Reflection: Reflection links different research stages (such as the stage of orientation and planning, the stage of data collection and the stage of interpretation) to enable modifications of the research focus.

Explication: Aspects of the research process (e.g. setting, sampling) have to be defined.

5.1 Orientation phase

During the phase of orientation, a systematic literature review was conducted. The BOKU database “BOKU:LITsearch” was used to conduct the literature review. A keyword-based search was conducted using keywords “learning, gender, development, agriculture, Nepal”. During the orientation interviews, the SAF-BIN projects’ gender strategy has been reviewed and the conceptualization of the study took place. The conceptualization involved writing a concept note of the study including designing the methodological approach (Figure 3).

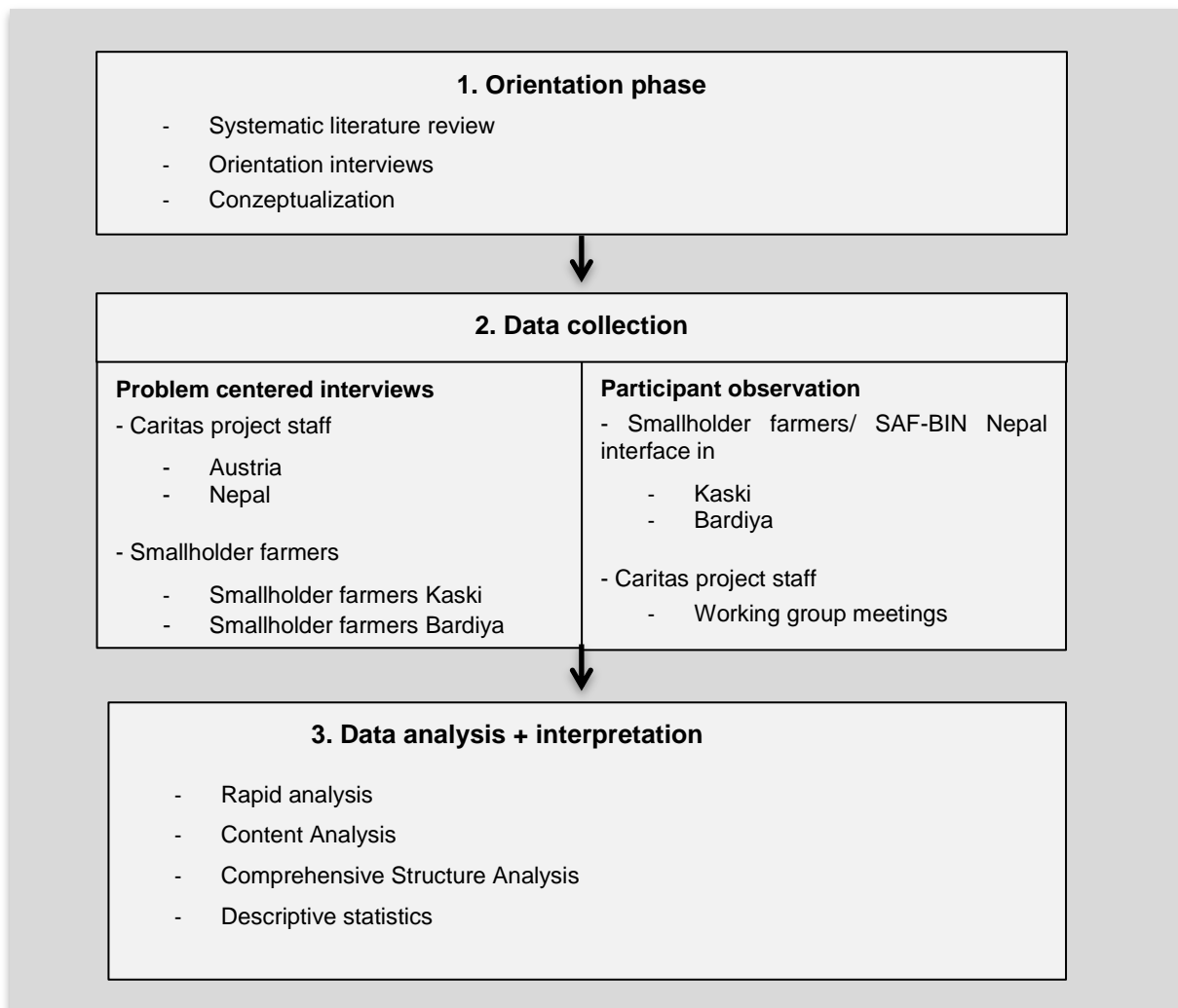


Figure 3: Methodological design

Source: Own illustration

5.2 Data collection

The phase of data collection is described in this chapter, which comprises the explanation of the used methods, such as the description of study sites and sample.

5.2.1 The problem-centered interview

Problem-centered interviews with an open initial question were conducted. This is an open form of guided interview (Witzel 2000) taking knowledge generated in prior phases of the study, into consideration.

Communication strategies of interviewers aim to get an understanding of the interviewees' subjective perspective of a problem. The narration of the interviewee is combined with dialogue, which results from the interviewers' inquiries.

An initial question was formulated, which had two criteria: it should be relevant for the living environment of the conversational partner and it should trigger a narration (Lueger 2000): „Could you briefly introduce us to the project?“. A spontaneous narration was then initiated. The characteristics (arrangement, length, focus) of the narration allowed drawing first conclusions of the interview partners' living environment. In a semi-structured interview, ad-hoc-questions (open-ended and close-ended), based on the interview guide, bring up relevant study issues (Witzel 2000; Lueger 2010) and in this way rotate narration sections with question-answer or dialogue sections.

In this study, interview guidelines were designed, which served as orientation and to stimulate narration and dialogues. Prepared questions ensured that the central study interest was raised. The interview process was pretested during the first weeks of the field stay with the translator and was reviewed by local and Austrian supervisors.

The formal, problem-centered interviews were combined with informal interviews, which can be regarded as „[...] an especially useful strategy for discerning different viewpoints held by insiders.“ (Jorgens 1989, p.88). The participants gave their written consent that the material can be used for this study after the interviews.

As there are more women than men participating in SAF-BIN within the study sites, also more female than male smallholder farmers were interviewed.

5.2.2 Participant observation

Participation allows you to experience activities directly, to get the feel of what events are like, and to record your own perception (Spradley 1980, p.51).

The method of observations is used to explore social systems and also to examine potential conflicts within an extended period (Atteslander 2008). Observation has a long tradition in applied sciences (e.g. in the field of ethnology) and was popularized in social science in the early 20th century (ibid.). Observation studies aim to explore people's behavior in a consistent and systematic way (Bortz & Döring 2006). In this study, the social, environmental and economic context and the project activities within this context were observed.

Of the wide range of observation forms, overt participant observation was identified as the appropriate method for this study. Participant observation (or field observation) means that the researcher directly visits the field of interest and collects data (Bortz & Döring 2006; Atteslander 2008). The different forms of observations are based on three dimensions: structure, openness and participation (Atteslander 2008). Structure refers to the process of observation and to the way of recording observations. Openness explains the degree of the observer's activity (participation). Both active and passive forms can be covert or overt (ibid.). While for this study the degree of structure and openness varied and was adapted to the setting, overt observation was conducted which means that the observed individuals or groups were informed about the role of the observer (Bortz & Döring 2006).

In contrast to everyday observation, systematical observation is based on an observation plan (ibid.). This plan specified for this study:

What was observed:

- Project activities and learning outcomes from a gender perspective
- The every-day-life of SAF-BIN participants of the project
- Quantitative dimensions e.g. the amount of people involved in project activities

When and where were observations conducted:

- In rural settings in Nepal from March 2014-May 2014
- In the districts Bardiya and Kaski

How were the observations documented:

- Research diary
- Photographs
- Audio recordings

In which way were the observations interpreted:

- Comprehensive Structure Analysis
- Content Analysis (Lueger 2010)

5.2.3 Study sites and their agricultural challenges

The VDC *Kalika* (located in the Bardiya district) and the VDC *Dhikupokhari* (located in the Kaski district) were the study sites of this study. Both VDCs participate in the SAF-BIN project since 2011. Selection criteria for the study sites addressed regional differences in terms of climatic conditions, agricultural activities, social structures and logistical feasibility.

The district of Bardiya with a focus on the VDC Kalika

The district of Bardiya is located in the Mid-Western Development Region of Nepal (Subba 2002). Most of Bardiya is situated in the Terai plains (cf. chapter 2.1).



Figure 4: Picture of Kalika, Bardiya

Source: Katharina Zangerle

The region is part of the Bheri Zone with Gulariya as headquarter and is bordered by India (Uttar Pradesh) to the south.



Figure 5: Map of Nepal, Bardiya district indicated in red

Source: Wikipedia (2015a)

The Bardiya National Park, that has an area of around 970 square meters, covers most of the northern half of the district, while most of the rest is covered with agricultural land (Majupuria & Kumar 1998).

In Bardiya, smallholder farmers of six VDCs participated in the SAF-BIN project: Kalika, Belawa, Gulariya, Mainapokhar, Motipur and Tarataal. These six VDCs constitute the project region in Bardiya. The VDCs belong to the Terai and to the lower tropical climate zone. The altitude of the VDC Kalika is 126 meters above the sea level. The population in Kalika is 953 and the average household size is 5.04, which is lower than the average household size in the project region (Joshi 2014a).

In the project region in Bardiya, around 75% belong to an ethnic group called Janajati. People who belong to a specific ethnic group do not necessarily belong to a specific caste in Nepal. However, often there are interlinkages of the categories ethnic group and caste (Westendorp 2012). Janajati and the caste group called Dalit have a lower status and belong to disadvantaged groups (Hachhethu 2003). People belonging to the Janajati do speak different mother tongues (e.g. Newars, Gurung, Tharu, Magar, Tamang, Bote, Chepang) and are mostly not Hindus (ibid.). Disadvantaged caste groups like the group of the Dalit have Nepali as mother tongue and Hinduism as a main religion (ibid.). Around 10% in the project region in Bardiya belong to disadvantaged caste groups (Joshi 2014a). Hill Brahmin and Chhetri are considered as advantaged caste groups. People belonging to this caste have a

higher status in the social structure of the country, Nepali as mother tongue and Hinduism as the main religion (Hachhethu 2003). Around 15% of the people in the project region belong to this group (Joshi 2014a). In Bardiya as a whole, the majority of the population belongs to the ethnic group called Tharu. The composition of the SAF-BIN participants is typical to the composition of Bardiya and Kaski.

The average literacy in the project region is around 28%, which is below the national literacy average. In the project region, the literacy rate of women is lower than of men (Joshi 2014a). In Kalika, only around 24% of the population is literate (Joshi 2014a).

Table 2: Demographic information of the VDCs Kalika and Dhikurpokhari

	Population (persons)			Average household size (persons)	Ethnic/caste diversity (% of population)		
	Male	Female	Total		Janajati	higher caste	lower caste
Kalika	480	473	953	5	38	39	23
Dhikurpokhari	131	113	244	5	4	23	73

Source: Joshi 2014a; Joshi 2014b

The majority of the people living in the district Bardiya are farmers and thus, agriculture plays a major role in the local economy. In the project region, only 23% of the smallholder farmers have more than 1 ha of land, whereas 63% of the smallholder farmers have less than or equal to 0.5 ha of land (Joshi 2014a).

The main crop in this district is rice followed by maize, wheat, lentils, mustard and fruits. Farmers cultivate both improved and local varieties of the crops. Rice is also a staple food in this area. Also, livestock husbandry plays an important role in the small-scale farming systems of the region. Among the large milk breeds, buffalo is the preferred species as buffaloes produce more milk than cows with higher fat percentage fetching a better price in the market. However, numbers of cows was still higher than the buffalo population (Joshi 2014a). Goats and poultry will be found on almost every farm. Harvesting is done manually in all VDCs. Both traditional and improved processing methods are used to process key cereal crops. For food

storage, bamboo bins, mud bins, plastic sacs are commonly used, but the use of metal bins is increasing in the VDCs.

Smallholder farmers in the project region face problems such as drought, irregular rainfall and temperature increase (Joshi 2014a). People suffer increasingly from food insecurity due to crop failure. Smallholder farmers perceived low yield of crops as one of their key problems. Adaptation and coping strategy to changing climatic conditions involve the use of robust seeds, the cultivation of drought tolerant hybrid rice varieties and the adjustment of sowing and harvesting time according to the rainfalls (Joshi 2014a).

The district of Kaski with a focus on the VDC Dhikurpokhari

The Kaski district is located in the Western-Development Region of Nepal under the Dhaulagiri zone with Pokhara as district headquarters (Subba 2002). It is situated in the Hills and Mountains of Nepal. Kaski is characterized by hilly topography ranging from about 300 meters to more than 6000 meters above the sea level, high rainfall and sub-tropical climate (Pariyar 2005).



Figure 6: Picture of Kaski

Source: Katharina Zangerle

It is one of the most frequented tourist destinations of Nepal because it covers part of the Annapurna mountain range, but agriculture is still its predominant economic activity.

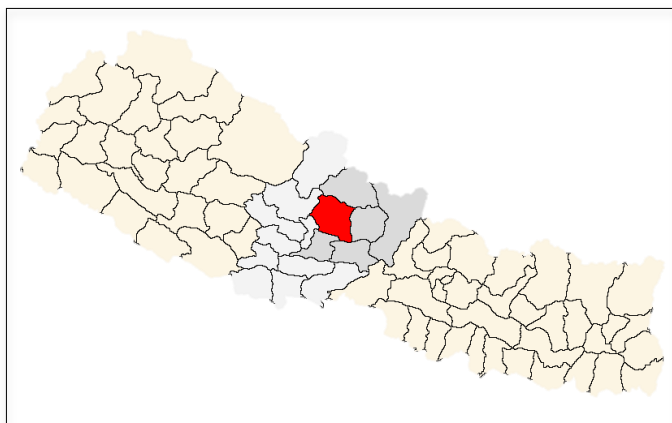


Figure 7: Map of Nepal, Kaski district indicated in red

Source: Wikipedia (2015b)

In Kaski, 30 smallholder farmers' collectives were formed in 10 VDCs. The VDCs that participated in SAF-BIN were: Nirmalpokhari, Begnas, Hemja, Bharatpokhari, Kaskikot, Lumle, Macchapuchhre, Dhikurpokhari, Puranchaur, and Rupakot. In the VDC Dhikurpokhari, the interviews were conducted. Dhikurpokhari is 1508 meters above the sea level and has a population 244. The average household size is 4.7. The majority of households (more than 70%) in Dhikurpokhari belong to the Dalits, the disadvantaged caste group (Joshi 2014b). Especially in Dhikurpokhari the illiteracy rate is very high. More than 93% of the people are illiterate (Joshi 2014b).

In this project region, the average farm size is 0.5 ha and smaller (Joshi 2014b). The major crop in the Kaski district is rice followed by potatoes, maize, wheat and millet (ibid.). Rice is also the staple crop. Besides cereals, vegetables are preferred including potatoes (ibid.).

Livestock is an important part of the farming systems in this region (ibid.). Milk and milk products, egg and meat are consumed and sold by smallholder farmers (ibid.). Small or large livestock are sold in cases of emergencies. The majority of smallholder farmers keep large animals for use as draught force (ibid.). The livestock in Dhikurpokhari comprises goats, followed by buffalos, poultry, bullocks, sheep and cows (ibid.). Goats are the most popular small livestock as they can generate fast cash. Smallholder farmers face problems such as irregular rainfall and temperature increase (Joshi 2014a). Further, it was perceived that outbreak of diseases and pest on plants increased. Besides, reservoirs and rivers' water level has decreased, as well as human resources working in agriculture. Coping strategies in the region

involve the adjustment in sowing and harvesting time according to the rainfall, selection of robust seeds, selection of drought-tolerant variety, crop replacement and out migration (Joshi 2014b).

5.2.4 Sample

Caritas Nepal acted as contact during study conception. The Caritas project staff provided access to interview partners and study logistics. In agreement with Caritas Nepal, the study sites were selected. Project activities and outcomes in 6 smallholder farmers' collectives, located in two VDCs (Kalika and Dhikurpokhari), were explored. Each SHFC consisted of 15 male and female farmers. In total, 32 formal face-to-face interviews were conducted including one test interview, which was conducted in the district of Kaski. Male and female farmers were interviewed. From every SHFC, 3-5 smallholder farmers were interviewed (Table 3). 22 smallholder farmers and ten persons from Caritas project staff were interviewed and their activities observed. Interviews with the Caritas project staff comprised interviews with Village Research Assistances from the study villages, District Project Officers and project coordinators in Nepal and Vienna as well as one evaluator (Table 3).

Table 3: Number of conducted interviews by gender, region and affiliation

	Female	Male
SHFC 1 in Kalika	4	1
SHFC 2 in Kalika	2	2
SHFC 3 in Kalika	2	2
SHFC 4 in Dhikurpokhari	2	1
SHFC 5 in Dhikurpokhari	2	1
SHFC 6 in Dhikurpokhari	2	1
Village Research Assistants	2	1
District project officers	-	2
Project coordinators Nepal	-	3
Project coordinator Vienna	-	1
Evaluator	-	1
Total female and male	16	16
Total	32	

Source: Own data

Village Research Assistants work in direct contact with smallholder farmers and thus have a unique perspective on learning dynamics. The evaluator was hired by Caritas Nepal to conduct a mid-term project evaluation.

Participatory observation of group meetings allowed the observation of specific roles within the groups. The interview partners were chosen due to criteria such as gender, degree of participation in the observed group meetings, official group function and willingness to conduct an interview. This strategy could only be applied in those cases in which the participant observation of the group meetings had been realized before the interview process. This was possible for all groups in Bardiya. In Kaski, only two of the three group meetings were observed due to time limitations. In this case, the project staff (Village Research Assistant) selected the interview partners. It was not always possible to conduct the interviews in private. For instance, sometimes children did attend. The language barriers presented a challenge in the data collection process. With the aid of a translator however, hired by the project, this restriction was reduced. While the observations of the on-farm adaptive research trials for the most part took place in form of a “tour” guided by the Village Research Assistant and/or farmers, agricultural activities and related gender roles were observed in an informal way. Additionally to observations of group meetings, on-farm adaptive research trials and agricultural activities, also working group meetings of Caritas project staff were observed in the Kaski region. This was of particular interest, because the meeting of the District Project Officers and all Village Research Assistants of the district, provided insights of the overall project activities, and challenges in the district from the Village Research Assistants perspective.

5.3 Data analysis

The study was designed as an iterative and reflexive process (Lueger 2010). Research steps overlapped and units of reflection are regarded as part of the research process. A *Rapid Analysis* was conducted previous to the detailed data analysis (Beebe 2001). For an in-depth analysis, a combination of *Comprehensive Structure Analysis* and *Content Analysis* were chosen (Lueger 2010).

The data was explored based on an inductive-deductive interplay¹¹. While the data was analyzed based on pre-built categories (deduction), also newly identified categories were built (induction). Based on thematic clusters, the text was examined for system effects and subjects of interests.

The basis of data analysis

The data gathered was documented as notes, pictures and audio records. Observations and informal interviews were documented in a study diary (field notes) and through taking photos. The interviews were transcribed with the transcription software f5. Partially, pseudonyms were used and information allowing identification of the interviewees was changed to ensure anonymity. Partly, the translator used the 3rd person pronouns (e.g. “he/she is using organic fertilizers ...”. In literal citations, this was changed to the first person form. The analysis was supported by the software *Atlas.ti*, which is a workbench for the qualitative analysis of large bodies of textual data (Atlas.ti 2002-2014) and excel.

Rapid analysis

Through the rapid analysis, relevant information that appeared during the interviews or observation was identified and knowledge about relevant issues was deepened in the following interviews or observations (Beebe 2001). For instance, a recurring issue discussed within the group meetings referred to job migration. Thus, the questions how migration affects the community were addressed during the following interviews.

¹¹ Deduction works: „[...] from the more general to the more specific. [...] We might begin with thinking up a *theory* about our topic of interest. We then narrow that down into more specific *hypotheses* that we can test.“ Induction works: „[...] the other way, moving from specific observations to broader generalizations and theories.“ (Trochim 2006)

The rapid analysis also allowed detecting information gaps that needed to be further explored in the following data collection process. Further, the on-going rapid analysis of the collected data allowed preliminary findings that were shared with different stakeholders. Thus, it was possible to receive immediate feedback from stakeholders.

Content Analysis

The content analysis was used to identify and structure issues that appeared during the data collection process. Following procedure was applied: The transcripts were imported to Atlas.ti. Each interview was categorized using codes of the pre-defined analytical framework. Codes are presented in Table 4.

Table 4: Codes and sub-codes

CODES	Sub-code	Explanation
Gender & diversity	Gender distribution project activities	How many men and women participate in the project activities?
	Gender roles project activities	What roles do male and female smallholder farmers have within the activities?
	Gender distribution transformative learning	Do the activities allow critical reflection, dialogue and individual experience for men and women?
	Gender aspects instrumental learning outcome	Which skills, information and techniques are learned by male and female smallholder farmers?
	Gender aspects communicative learning outcome	Which management skills, analytical skills communication skills and concepts that are learned by male and female smallholder farmers?
	Gender aspects partly realized impacts	Which are partly realized impacts for men and women?
	Gender aspects potential impacts	Which are potential impacts for men and women?
	Ethical diversity	Do the activities allow participation of disadvantaged ethical groups and castes?
Project activities	Activities conducted in Kaski	Which activities were conducted in Kaski by SAF-BIN?
	Activities conducted in Bardiya	Which activities were conducted in Bardiya by SAF-BIN?
Transformative learning	Critical Reflection	Do the activities allow critical reflection?
	Dialogue	Do the activities allow dialogue?
	Individual Experience	Do the activities allow individual experience?
Instrumental learning	Climate Change	Which skills, information and techniques regarding climate change are learned by smallholder farmers?
	Cultivation practices & inputs	Which skills, information and techniques regarding cultivation practices and inputs are learned by smallholder farmers?
	Human Health	Which skills, information and techniques regarding human health are learned by smallholder farmers?
	Farming as business	Is farming increasingly seen as business?

Communicative learning	Management skills	Have management skills been achieved? Management skills refer here to e.g. planning, organizing.
	Communication	Have communication skills been achieved?
	Analytical capacities	Have analytical skills been achieved?
	Concepts	Have new concepts been learned?
Learning impacts	Partly realized impacts	Which partly realized impacts result from the learning outcomes?
	Potential impacts	Which potential impacts result from the learning outcomes?

Source: Own data

Additional codes were included in the analysis following an explorative approach. The additional codes included: the respective instrumental and communicative learning outcomes and impacts (Table 4). The system effects were identified using the Comprehensive Structure Analysis. This analysis was complemented using the field notes that were taken during informal interviews and participant observation. The field notes were also coded and analysed the scheme (Table 4).

Comprehensive Structure Analysis

While the *Comprehensive Structure Analysis* allows identification of system effects, the *Content Analysis* allows carving out subjects of interest (ibid.). Interactive moments (for example sympathy, insecurity, hierarchical aspects) impact the interview atmosphere and have thus to be reflected and incorporated in the analysis (Lueger 2010).

Comprehensive Structure Analysis was done through the following procedure: First, text phrases from different codes of the previously conducted content analysis were selected. From every code, random phrases were selected. Then, a paraphrase of the selected phrase was done. By using paraphrases, a restatement of the phrase is achieved. Afterwards, the context of this statement was identified. It is asked how the meaning of the phrase possibly could have come up. Finally, the hypothetical context of the effects (the context of interaction and context of systemic action) was identified (Lueger 2010).

Descriptive statistics

Qualitative research often comprises quantitative elements. Thus, in addition descriptive statistics were used to quantitatively describe basic features of the data e.g. the sample including the gender distribution. Due to the simple description, it was possible to conduct the analysis with the software Excel.

Reflections on methods

Validity and reliability in empirical social research are general challenges and requirements. While reliability can be defined as, “(...) the extent to which a measurement tool gives consistent results”, validity can be defined as the, “(...) extent to which a measurement tool measures what it is supposed to measure (...)” (Study.com 2015). Golafshani (2003) critically addresses the challenge of defining validity and reliability in qualitative research paradigm. Reliability and validity are rooted in positive research perspectives and thus have to be redefined for their use in a qualitative research (ibid.). Reliability and validity are conceptualized as trustworthiness, rigor and quality in qualitative paradigm (Golafshani 2003). A way to achieve valid and reliable studies is triangulation, which is a procedure where researchers search for convergence among multiple and different sources of information (Creswell & Miller 2000). In this study, multiple sources of information have been used through engaging multiple methods and interview people with different roles. The methods applied were found to be suitable to answer the research questions. Further, peer researchers’ can be involved in the interpretation of the data in order to improve the analysis (Golafshani 2003). The analysis of this study was conducted by one researcher only. However, the findings were discussed and adapted through discussions with several investigators.

Desirability in social research describes the tendency of interviewees to answer questions in a way that will be viewed favorably by others (Shames 2011). In order to address this challenge, interviews were held in private. Further, confidentiality was assured at the beginning of the interviews.

The interviews were influenced by the daily routine of the farmers in some cases. While disturbances such as children playing, livestock disturbing or mobile phones can be regarded as limitations, these influences can also allow further explorations of

the farmers' living environments. In this study, these "disturbances" were documented in the fieldwork diary and integrated in the analysis.

In participant observation, the exploration of social systems is based on the interpretation of social behavior. At the same time, the observation itself is social behavior (Atteslander 2008). Because overt observation implies that the group of interest is informed about the role of the observer, challenges can result from these defined roles. It can lead to an effect of reactivity to observations. This effect is also known as the "observer effect", which refers to the influence that an observation procedure exerts on behavior (Kazdin 1979). This challenge was addressed by integrating potential effects of reactivity in the analysis.

The gender distribution in the groups was unequal. There were much more women than men participating in the groups, which made it difficult to identify differences between men and women. A quantitative analysis including a minimum number of men and women could have alternatively been applied.

6. Results and discussion

6.1 Description of farmer groups and interview partners

In comparing socio-economic categories of smallholder farmers in Dhikurpokhari and Kalika, differences between and within the groups become obvious. In terms of gender distribution, results show that there are more women than men participating in the SAF-BIN project in the study sites (Table 6).

Table 5: Gender distribution in smallholder farmers' collectives

GENDER DISTRIBUTION	Kalika		Dhikurpokhari	
	Female	Male	Female	Male
SHFC 1	13	2	14	1
SHFC 2	8	7	13	2
SHFC 3	13	2	13	3
Total	34	11	40	6

Source: Own data

The female participation of smallholder farmers in the SAF-BIN project is very high in Nepal as a whole and also in both study sites Kalika and Dhikurpokhari (Farming First 2013).

One reason for the unequal gender distribution in the smallholder farmers' collectives may be what Bhadra & Shad (2007) call the 'feminization of agriculture'. Women comprise a greater proportion of agricultural labor force; women perform the majority of the agricultural tasks and women spend the majority of their working hours in agriculture. Work migration of young people and men feminized agriculture in Nepal (Acharya 2003; Bhadra & Shad 2007; Westendorp 2012). Often, men have the possibility to work in other sectors or regions while women have to take over farming and household activities to secure the livelihood of the family (Duggan et al. 2006).

Besides gender, smallholder farmers' collectives in the two study sites differ regarding further socioeconomic factors (Table 6).

Table 6: Socioeconomic factors of interviewed smallholder farmers

SOCIOECONOMIC FACTORS		Kalika Interviewees		Dhikurpokhari Interviewees	
		Female n=8	Male n=5	Female n=6	Male n=3
Educational Level	Uneducated	3	-	-	1
	1-4 years	1	1	2	1
	5-9 years	4	1	4	1
	School Leaving Certificate	-	3	-	-
Marital status	Married (including Female Headed Households)	6	4	6	3
	Unmarried	-	1	-	-
	Widowed	2	-	-	-
Age	Average	31	31	37	57
	Range	24-59	20-51	27-48	51-65

Source: Own data

In Kalika, three of the interviewed smallholder farmers hold a School Leaving Certificate (SLC), which is the final examination of the secondary school system in Nepal. Students take this examination for completing the 10th grade of their study.

Similarly, data show that of the 953 inhabitants of Kalika, the average literate percentage in Kalika is at around 24% while the literacy rate of men (around 21%) is slightly lower than those of women (around 27%) (Joshi 2014a).

From the interviewed smallholder farmers, 4 were the head of female-headed households. From around 190 households in Kalika, about 31 are female-headed (Tasli 2007; Joshi 2014a). The average household size in Kalika is around 5 persons per household, which is lower than the average household size in the project region in Bardiya (Joshi 2014a). In Bardiya, the average household size is around 6 persons per household (ibid.).

Farmers of smallholder farmers' collectives mostly belong to disadvantaged caste group called Dalits and have less than 1ha land. 23% of the smallholder farmers have more than 1ha of land in Bardiya, whereas 63% of the smallholder farmers have less than or equal to 0.5 ha of land (Joshi 2014a).

In Dhikurpokhari, 1 of the interviewed smallholder farmer has never gone to school and none of the interviewed smallholder farmers hold a SLC. According to Joshi (2014b) more than 93% of the people in Dhikurpokhari are illiterate.

In Dhikurpokhari in general, smallholder farmers belong to different caste and ethnic groups. Smallholder farmers of the respective smallholder farmers' collectives in Dhikurpokhari often belong to the same ethnic group or caste. Group members from smallholder farmers' collective 1 belong to a higher caste while smallholder farmers' collective 2 is a mixed group regarding the category caste and group members of smallholder farmers' collective 3 belong to a disadvantaged caste or ethnic group. The accumulation of participants belonging to a specific caste or ethnicity in the groups might result from the geographical distribution of ethnicities and castes in Nepal (Joshi 2014a; Joshi 2014b). In this study site, the majority (more than 70%) of around 240 inhabitants of Dhikurpokhari belong to the disadvantaged caste group called Dalits (Joshi 2014b).

Farmers in the smallholder farmers' collectives in Dhikurpokhari have a diverse marital status including people who are married, single and widowed. Also, members of female-headed households participate in the smallholder farmers' collectives in this study site. In Dhikurpokhari, there are about 50 households and about 10% are female-headed (Joshi 2014b).

In Dhikurpokhari, the farmers who participate in the project have little land. Accordingly to the situation in the whole district, the majority of the farm households have less than or equal to 0.5 ha of land (Joshi 2014b).

In both study sites, agriculture is subsistence-oriented. Comparing different smallholder farmers' collectives, the composition of the smallholder farmers' collectives is quite diverse including people from diverse age classes, castes, ethnic groups and people with diverse marital status. However, within some smallholder farmers' collectives, there is a much higher diversity regarding castes and ethnic groups than in others e.g. smallholder farmers' collectives in Dhikurpokhari.

6.2 Project activities and features of transformative learning

The analysis of project activities addresses the first research question: *In which ways do the activities conducted allow learning within SAF-BIN for men and women?*

Within SAF-BIN, a range of project activities were conducted in both study sites Kalika and Dhikurpokhari (Table 7).

Table 7: Project activities in the study sites

PROJECT ACTIVITIES	Dhikurpokhari	Kalika
Base line study	X	X
Multi-stakeholder forums	X	X
Using resource centers	-	X
Group meetings	X	X
On-farm adaptive research	X	X

Source: Own data

The potential of these activities for transformative learning for the project participants are analyzed along the elements of transformative learning.

6.2.1 Dialogue

Through participation in different project activities, dialogue between project staff and smallholder farmers, as well as between and within smallholder farmers' collectives, was facilitated.

Dialogue within smallholder farmers' collectives is primarily facilitated through regular group meetings of the smallholder farmers' collectives. The frequency and duration of the group meetings vary depending on the growing season, project phase and agenda and is determined by the group members. While smallholder farmers in Kalika meet on a weekly basis, the groups in Dhikurpokhari meet each month.

The meeting point is determined by the group members and is located in public or private places in the villages e.g. in front of a shop or house of a participant. The meeting points of every smallholder farmers' collective are easily accessible for the participants.

The agenda of the meetings is mostly associated with the field trials, cultivation practices and inputs in general, climate change and the organization of the farming system. But there is also room to discuss issues such as human health or cooking. The group members are in charge of the agenda. The group leader, the so-called 'president' makes suggestions regarding the agenda.



Figure 8: Smallholder farmers in Kalika present the collected data

Source: Katharina Zangerle

The group members assign specific functions to individual group members. Candidates for the function 'president', 'secretary' and 'treasurer' are elected by the group members. Discussions are the basis for the election process.

Group meetings take place in a structured way. Mostly, the 'president' is in charge of the opening and the guidance of the meeting. Women tend to fulfill the functions of 'secretary' and 'treasurer' while 'president' (the group leader) tends to be rather fulfilled by older, "experienced" women or men because it is understood to be the most responsible position. Upcoming decisions are made in common while the president suggests proposals for solutions previous to a group vote.

Prior experiences of the project participants (smallholder farmers and project staff) enable discussions within the groups. Everyone has prior experiences and they are more diverse in with participants of various social backgrounds e.g. in "mixed groups" regarding gender and other socioeconomic factors, the participants have diverse prior experiences. Especially the opinion of experienced, older participants is considered as enriching by the smallholder farmers. Some smallholder farmers also

have prior experiences due to participation in former projects (IPM projects) or due to longtime experiences in farming.

Besides official project activities, informal dialogue of smallholder farmers was maintained in the villages. Discourse with smallholder farmers that are not members of smallholder farmers' collectives was facilitated because new topics of conversation are generated due to the project activities.

Also dialogue between Village Research Assistants and smallholder farmers was facilitated through regular group meetings. The Village Research Assistant and the group members discuss experiences on the field trials, cultivation practices and inputs in general, climate change and the organization of the farming system during the group meetings. Further, the Village Research Assistants act as gatekeepers. Thus they enable dialogue between different smallholder farmers' collectives, between smallholder farmers' collectives and other project staff e.g. between smallholder farmers' collectives and District Project Officers and also between smallholder farmers' collectives and other stakeholders such as scientists. While in Dhikurpokhari open dialogue between the Village Research Assistant and the smallholder farmers' collectives is facilitated, open dialogue in Kalika is not always maintained e.g. smallholder farmers are skeptical regarding changes in farming initiated by the project.

For the project staff, interregional and international exchange of experiences has been facilitated. At SAF-BIN project meetings and conferences at the regional and international level, experiences were exchanged. Dialogue between smallholder farmers and project staff sensitized the project staff for farmers' needs, their expertise and their strategies.

The project staff organized multi-stakeholder forums in the regions at the starting phase of the project. Local stakeholders including potential beneficiaries, scientists and government officers were contacted to discuss potential project activities. Regional challenges and project objectives were introduced by the project staff and discussed with relevant stakeholders. Interested smallholder farmers - some of them had taken part in a former Caritas led IPM program - participated in this forum and had the chance to learn more about and discuss the planned SAF-BIN activities.

6.2.2 Individual experience

Individual experience was particularly facilitated through group meetings and on-farm adaptive research for smallholder farmers' collectives and project staff in both study sites.

Individual experience for smallholder farmers and Village Research Assistants is facilitated through on-farm adaptive research. On-farm adaptive research processes took place within different stages (planning, installing, monitoring, nurture, data collection, data analysis).

First, the setup of the field trials was designed based on previous activities such as the baseline survey, multi-stakeholder forums and group meetings, by Caritas Nepal and smallholder farmers in consultation with Nepal Agricultural Research Council (NARC). Caritas Nepal and NARC provided technical inputs and assistance. The tested technologies were picked by the Caritas staff. Different smallholder farmers' collectives focused on different trials depending on the agricultural context in the project sites and varying climatic conditions.

For instance, in Kalika, a region that is prone to droughts, drought-tolerant seed varieties were tested and compared with local seeds within "varietal wheat trials". The new seed variety called Gautam was released by NARC and distributed by Caritas Nepal.



Figure 9: Smallholder farmers in Kalika present the wheat trials

Source: Katharina Zangerle

After the setup of plots, continuous monitoring, nurture and evaluation of the plots were necessary. During the monitoring phase, data was collected by smallholder

farmers and Village Research Assistants. The parameters of interest generally were depending on the trial. In the “varietal wheat trial”, parameters such as yield height, plant height and insect based problems were analyzed. Within the group meetings, the collected data that derive from the on-farm adaptive research were presented via charts or oral presentations and discussed.

Gautam was found to be more drought-tolerant, which can facilitate the cultivation in the context of increasing water scarcity. In comparison to local varieties, here the “improved practice” result in higher yields, higher plants, more spikes, less insect based problems and easier manual weeding. Both men and women, holding different group functions, presented data. Decisions on adaptations of the plots are made after an analysis of the collected data and partly after consultation with project staff within the group meetings. Other groups in this Kalika tested different types of mulching techniques such as plastic mulches (thin vs. thick) such as mustard and straw mulches.



Figure 10: Smallholder farmers test mulching techniques

Source: SAF-BIN

Other smallholder farmers’ collectives in Kalika systematically compare the practices broadcasting and line sowing of wheat seeds, analyze the impact of soaking the seeds or conduct irrigation trials (drip irrigation and plastic mulches) in the drought areas (please find a more detailed description in the annexe).

In Dhikurpokhari, that is located in a more humid region, the focus was on vegetable trials. Tomato trials were conducted by two smallholder farmers’ collectives in the Dhikurpokhari. Tomato tunnels were built by the smallholder farmers on easily accessible land of a group member. Due to the management possibility of humidity

and temperature, an increase in tomato production, a reduction of diseases and an improvement in fruit quality were expected by the smallholder farmers and the Village Research Assistant.



Figure 11: A smallholder farmer in Dhikurpokhari in her tomato tunnel

Source: SAF-BIN

6.2.3 Critical reflection

Critical reflection of smallholder farmers and project staff was particularly facilitated through on-farm adaptive research in both study sites. Critical reflection was required to conduct the on-farm adaptive research. At the same time, on-farm adaptive research can foster the ability to critically reflect. In the on-farm adaptive research process, smallholder farmers interpreted the collected data and thus reflected on field trials. Also, the suitability and sustainability of the varietal wheat trials was reflected. For instance, some smallholder farmers questioned the uncertain input supply in the context of “varietal trials” after the project duration. Inputs like drought tolerant seeds and irrigation systems could not be afforded in the past, and it is unclear if the practices can be maintained after the program due to financial restrictions.

Within group meetings, smallholder farmers commonly reflect on changes and potential impacts of the project on the farming systems. Through the group meetings, smallholder farmers also reflect their roles. Especially in mixed groups, smallholder farmers increasingly reflect on inequalities. Also, gender relations are reflected through group dynamics. Also in decision-making processes, gender relations are reflected because gender inequalities become apparent in decision-making e.g. especially male household members make decisions regarding farming, even if they work and live abroad.

Through resource centers that were established at the district level in Bardiya, critical reflection of smallholder farmers is supported on an irregular timely basis. The resource center provides demonstrative information regarding climate change and its consequences for smallholder farmers. Learning material involves brochures and picture books for the younger people and adults. It serves as an information point for smallholder farmers and project staff. The project staff has the opportunity to access the learning material and forward it to the groups. Smallholder farmers can access the centers as well. However, the resource centers are rarely visited by smallholder farmers due to the long distances between some villages and the resource centers.

Through the baseline study, that was conducted at the starting phase of the project, the project staff critically assessed the challenges smallholder farmers are facing. Quantitative and qualitative data was collected from the project staff in the project sites using tools such as Participatory rural appraisal (PRA) and household surveys and analyzed. The study served the project staff to get an overview of the local

context and challenges smallholder farmers in the project regions are facing. Through the baseline study, the project staff critically reflected on challenges farmers are facing in regard to e.g. climate change, land holding pattern, land use pattern, capital assets situation, cropping patterns, food handling and management and livestock.

Discussion of project activities and features of transformative learning

Project activities allowed key features of transformative learning: critical reflection, dialogue and individual experience for men and women (Taylor 2007; Taylor 2009; Mezirow et al. 2009).

Especially regular group meetings facilitated dialogue for both project staff and smallholder farmers. Further, dialogue with non-participants is maintained. Through dialogue, farmer-to-farmer extension is facilitated and adoptions are more likely to spread in the communities (Rogers 1995; IITA 2010). Through these project activities, a kind of dialogue in which project participants focus on content and use rational arguments, was facilitated. Mezirow (1994) argues that this kind of dialogue is necessary for transformative learning (Mezirow 1994).

Individual experience of smallholder farmers and project staff was especially facilitated through project activities like on-farm adaptive research. Learners interacted with their living context that involves physical space. It appears, that this is one key to adult learning (John-Steiner et al. 1996; INAFI 2005; Rogoff 1995 in Wu & Wu 2015).

Critical reflection was especially facilitated through group meetings, on-farm adaptive research and the provision of resources. Through these activities, the reflection of the content and processes was facilitated, which is necessary for transformative learning (Taylor 2009). The reflection of processes and content is for example expressed, when smallholder farmers question some contents, processes within the project. Also through resource centers, dialogue and critical reflection can be fostered, if access for smallholder farmers is ensured. Village Research Assistants have a key role in the provision and distribution of the resources. For facilitate learning, it is important that smallholder farmers are not being seen as recipients (Percy 2005). Thus, an unlimited access to resources should be facilitated also for remote villages. More resource centers that are evenly distributed in the districts could help to overcome

this challenge. The Village Research Assistants acts primarily as a facilitator of the project activities rather than experts, which is a characteristic for learning within participatory approaches (Percy 2005).

Thus, different project activities tend to foster special elements of transformative learning. However, the elements of transformative learning in this study are interrelating which supports Taylors' (2009) remark, that the key elements have an interdependent relationship and one element can function as a precondition for the other element. Thus, it appears that the quality of dialogue influences the degree of critical reflection and individual experience and vice versa. Furthermore, the project activities that facilitate elements of transformative learning are interrelating. One project activity is a precondition for the other. For instance, dialogue through discussions about data within group meetings is facilitated through previously conducting the on-farm adaptive field trials.

Although project activities in the smallholder farmers' collectives are similar, elements of transformative learning are not. For instance, political challenges such as unclear land rights and political riots in the past years in Kalika challenge the learning of farmers. The new and partly unclear situation regarding land rights leads to social tensions in the groups. Thus, learning is highly influenced by social and cultural learning context (Baumgartner et al. 2007; Wu & Wu 2015).

Results show, that especially the participation of people with different social backgrounds fosters dialogue and critical reflection. Through collective action, it is reflected roles of women and men, such as those of disadvantaged castes and advantaged castes. Especially "mixed groups" that include marginalized people such as women and people from disadvantaged castes build the basis for dialogue and critical reflection. Due to diverse social roles e.g. productive role, reproductive role of the participants, people have diverse prior experiences (Moser 1993). What each learner brings (prior experience) is important to facilitate transformative learning (Taylor 2009). Thus, diversity of the smallholder farmers' collectives regarding gender and other socioeconomic factors supports discussions. A high diversity includes the participation of disadvantaged people. Participation means not only the presence of people, but also to have control over resources, taking over responsibilities and taking part in decision-making processes (Van der Heck 2003; Bliss & Neumann 2007). In this context those are especially people, who are in

multiple ways disadvantaged (intersectionality) such as for instance widowed women from disadvantaged castes (Crenshaw 2004).

A gender-sensitive learning environment does not necessarily mean that an equal numbers of women and men participate in the activities. It rather involves the promotion of equal access to resources such as development projects, which was realized within the project activities (IITA 2010; Lau & Yuen 2010).

6.3 Learning outcomes and their impacts

Communicative and instrumental learning outcomes of male and female smallholder farmers that are realized by the SAF-BIN project are presented in this chapter (second and third research question). Further, potential impacts resulting from the learning outcomes are presented (fourth research question).

6.3.1 Instrumental learning outcomes

Within the project activities, a range of instrumental learning outcomes was achieved by the smallholder farmers. Table 8 provides an overview of smallholder farmers' instrumental learning outcomes that are assigned to specific topics and the links with specific project activities and notable gender outcomes.

Table 8: Instrumental learning outcome

INSTRUMENTAL LEARNING OUTCOMES	Project activity	Instrumental learning outcome	Notable gender outcome
Climate Change	<ul style="list-style-type: none"> • Resource center • Group meetings 	<ul style="list-style-type: none"> • Knowledge and awareness about global and regional climate change • Willingness for adaptation • Links between climate change and farming 	
Cultivation practices & Inputs	<ul style="list-style-type: none"> • On-farm adaptive research • Group meetings 	<ul style="list-style-type: none"> • Knowledge about new varieties • Line sowing instead of broadcasting • Application of organic fertilizers (compost, animal manure) • Vegetable cultivation • Kitchen gardening • Mulching techniques 	<ul style="list-style-type: none"> • Especially men had learning outcomes regarding new varieties
Human Health	<ul style="list-style-type: none"> • Group meeting 	<ul style="list-style-type: none"> • Nutrients of food • Potential impacts of chemical pesticides and chemical fertilizers on health 	<ul style="list-style-type: none"> • Especially women consider health issues e.g. in cooking, kitchen gardening
Farming & business	<ul style="list-style-type: none"> • Group meetings • On-farm adaptive research 	<ul style="list-style-type: none"> • Professionalization of farming (diversification and specialization) • Water management (irrigation systems) • Farm management (efficiency in crop production, economic thinking, specialization) 	<ul style="list-style-type: none"> • Especially men had learning outcomes

Source: Own data

Climate Change

In line with the SAF-BIN project aims, male and female smallholder farmers increased their knowledge and awareness about climate change, the development of climatic conditions in the region and its links to farming. Partly, also children increased their knowledge due to child-friendly resources. While smallholder farmers had already been aware of changing climatic conditions in the past, such as the delay of the monsoon, there was no full awareness that these changes are results of global climatic changes.

Especially activities like mutual data interpretation within the group meetings lead to an understanding of climate change that is based on empiricism. Thus, there was a shift from acceptance of changing climatic conditions to a more solution-oriented discourse in the community and goes along with an increase of willingness for adaptation.

I17: [...] before joining the group I was not aware [...] about consequences of climate change. [...] we also face problem of drought and having different insects [...] But we did not think it is due to climate change. [...] #00:14:52-6#

Elements like increased dialogue within the community, individual and collective reflection and individual experiences - that were facilitated through the project activities - enabled learning within the communities (Taylor 2007; Taylor 2009; Mezirow et al. 2009).

Cultivation practices & Inputs

Male and female participants have increased their knowledge about crop cultivation practices and inputs. Especially on-farm adaptive research lead to the awareness that innovative cultivation practices and inputs lead to different production results e.g. that the cultivation of the wheat variety “Gautam” results in a different taste and amount of yield. Smallholder farmers rather preferred the new varieties, because of the increase in production.

I11: [...] after participating in this project, I am able to know about changing climate, its impact on crop production. [...] I am now cultivating new improved crop varieties, which give better yield than the existing one, which I used to grow since long time. [...] #00:23:30-3#

However, smallholder farmers are unsure if the new practices can be maintained after the project.

Field trials that allow testing "line sowing vs. broadcasting" go along with the notion of smallholder farmers that line sowing can result in more production. Further, the application of organic fertilizer (the use of compost and animal manure) is part of the technical learning outcomes of especially men. The use of organic fertilizers and the reduction of synthetical fertilizers have an influence on soil fertility. Further, mulching techniques, the benefits of kitchen gardening can be stated as important technical learning outcomes. Through knowledge sharing of experienced community members, also traditional farming practices are discussed in some smallholder farmers' collectives. In consequence, also traditional practices are recognized in the process in some smallholder farmers' collectives, which is necessary for the sustainable generation and dissemination of knowledge (IITA 2010).

Results show that the focus of the trials is in line with the agricultural context in the study sites. The main cereal crops in the region are rice, wheat and maize (Pandey et al 2009). Due to limitations of resources, not all main cereal crops were addressed within on-farm adaptive research. However, also livestock plays an important role in this region; the main livestock species are cattle, buffaloes and goats (Pariyar 2005). This is also the case in Dhikurpokhari, where the major cereals are rice, maize, millet, potatoes and pulses (Pariyar 2005; Tiwary 2005). Thus, issues that are considered as relevant by the smallholder farmers for their living context could have been addressed by the project. However, there is still the need for addressing further issues in the field of cultivation practices and inputs e.g. in the field of livestock.

In some smallholder farmers' collectives, especially men increased their knowledge in the field of cultivation practices and inputs.

Human Health

Smallholder farmers learned about potential effects of pesticides and chemical fertilizers on human health.

I19: [...]. After joining SAF-BIN I am well informed about the possible health hazards of different chemical inputs like chemical fertilizer, chemical pesticides. And after consuming such products they will long term affect our different organs. I am well informed about that and knowing that I will practice different

IPM practices like botanical pesticides. Before, I just ignored the amount of chemical pesticides for crop condition. # 00:55:11-4#

Also, the nutrient content of foods is discussed and smallholder farmers learned about the meaning of a balanced diet. Especially women consider health issues in their daily activities e.g. when they are cooking or when they do kitchen gardening.

I15: [...] the project told us to produce different types of seasonal vegetables, different varieties of crops [...]. I will practice it in my own farm. And it will ultimately help me, and my family to have a variety of food items, from cereals to different seasonal vegetables in time. And it will ultimately improve the health of my family. #00:34:33-4#

Especially women consider health issues, because women fulfill the reproductive role and community-managing role in the study sites, as well as in traditional societies as a whole (Moser 1993).

Farming & business

Farming is increasingly regarded as a business option. Smallholder farmers are willing to professionalize farming and try to find ways to increase their income through diversification or specialization.

I16: [...] My group members and me will also get the chance to generate increase, more income through different various sources, such like poultry keeping, [...] different seasonal and off-seasonal vegetables. And I sold them [the surplus] at the market [...].#00:13:26-6#

Some farmers report that they are already able to sell their products at the market if they have a surplus. Others hope to do so in the future.

I15: [...] I used to do traditional practices from cultivating to harvesting. And so on, which is not economic. And as we did trials to compare the own practices and improved practices, I found that improved practices bring better yield. And I will follow what I am doing in trial. I am following in my own farm for better performance. #00:30:47-7#

Economic thinking in regard to farming is increased, especially of men. The consideration of efficiency and effectiveness in farming is increased. For instance, following group discussions, drip irrigation systems were tested in the framework of on-farm adaptive research in order to analyze their suitability and effectiveness.

Especially in combination with vegetable production and as a response to increased periodic water scarcity, smallholder farmers find it to be a suitable and effective technique. Group members discussed approaches of IPM within group meetings, are aware of insect based diseases and consider pest control techniques.

I15: [...] before I was not aware of insects attacking the crop and now by joining in the group of SAF-BIN I am able to learn what kind of insect based diseases attacking what kind of crop and its possible solution. #00:09:07-6#

At the same time, smallholder farmers reflect on potential consequences of e.g. the use of chemical pesticides.

I16: [...] The thing that I like most in group meeting is that I and my group members knew that chemical pesticide against different disease pest is very harmful for us in long term in regard to our health, and so we must go for botanical pesticide instead of chemical pesticide. [...] #00:13:26-6#

In line with statements of IITA (2010) and Gustavsen (2014), results show that participation in action research of those concerned can result in acceptance and adoption of new practices and varieties. Besides the adoption of new practices and varieties, new values such as increasing importance of economic thinking are partly adopted by the smallholder farmers. Sage (2004) states that intended change in an action research project involves re-education, which refers to changing thinking patterns. Change is typically intended at the level of norms and values and expressed in action (Sage 2004).

Although learning outcomes of smallholder farmers are at the focus of this study, it should be noted that also the project staff are learners within SAF-BIN. The project staff has the notion that they are learners as well. This shows, that the farmers are rarely being seen as mere recipients or adopters and the extension agent as the sole expert, which is essential for successful participatory development programs (Percy 2005). By conducting a baseline study at the starting phase, knowledge exchange with project partners and colleagues such as the participation in workshops and trainings led to an increase of knowledge about climate change and cultivation practices in Nepal and neighbor countries. Due to the regular contact with smallholder farmers, the project staff also learnt more about traditional practices.

Additionally, the project work improved management skills of the staff. Skills like time management, strategic planning, the management of smallholder farmers' collectives, leadership skills and planning skills were improved.

Results show, that there are gender differences in some technical learning outcomes. Men rather tend to achieve learning outcomes in the field of technical learning. The reason behind that is a distinct gender division in labor in agriculture in Nepal. While male participants are rather engaged in tillage operations, the application of fertilizers, threshing, crop selection, mulching, and women are rather engaged in "soft work" such as sowing, weeding, drying and storage of products and livestock keeping (Bhandari 2007). Thus, men are especially interested in trials that focus on their "core activities" in agriculture. This is what Moser (1994) calls gender interests.

In the study sites, we find a special situation due to the job migration of men and political conflicts. Women need to overtake farming practices, which were formerly fulfilled by men. This is, what Bhadra & Shad (2007) call the 'feminization of agriculture'.

Addressing also activities that were not their core farming activity in the past, can strengthen the resources of women, which is the key of economic and political empowerment (Duggan et al. 2006; Farming First 2013; Oberhuber 2013). At the same time, womens' workload could be increased, when agricultural activities that were usually not fulfilled by women, are addressed (Momsen 2004).

In addition, "core activities" of women could be promoted. Those are activities, that Moser (1994) calls gender interests. For instance, livestock keeping is primary an exercise of women.

6.3.2 Communicative learning outcomes

In addition to instrumental learning outcomes, a range of communicative learning outcomes was achieved within SAF-BIN. Table 9 provides an overview of smallholder farmers' communicative learning outcomes. They are linked with specific project activities and notable gender outcomes.

Table 9: Communicative learning outcomes

COMMUNICATIVE LEARNING OUTCOMES	Project activity	Learning outcomes	Notable gender outcome
Management skills	<ul style="list-style-type: none"> On-farm adaptive research Groups meetings 	<ul style="list-style-type: none"> Planning Defining problems Defining short-term and long-term objectives Monitoring and organizing 	<ul style="list-style-type: none"> Especially women
Communication skills	<ul style="list-style-type: none"> On-farm adaptive research Group meetings 	<ul style="list-style-type: none"> Presentation skills and techniques Network building Increasing self-confidence 	<ul style="list-style-type: none"> Especially women
Analytical capacities	<ul style="list-style-type: none"> On-farm adaptive research Group meetings 	<ul style="list-style-type: none"> Methodological awareness 	
Concepts	<ul style="list-style-type: none"> Resource center Multi-stakeholder forums Group meetings 	<ul style="list-style-type: none"> Concepts e.g. sustainability, empowerment, leadership, gender equality 	

Source: Own data

Management skills

Within on-farm adaptive research and group meetings, smallholder farmers plan activities, organize and monitor activities and define problems as well as short-term and long-term objectives in common. Through these activities, management skills, which can be understood as determining what needs to be done for achieving result, were learned by smallholder farmers (Isaacs & McAllister 2013). Here especially female smallholder farmers increased their management skills. The fact that especially female smallholder farmers achieve management skills results from their role. Women have multiple roles e.g. the community-managing often associated with

management (Moser 1993; ITCILO 2013). There were a lot of participating women motivated to manage activities. Skills like planning, organizing, controlling and directing facilitated farmers' economic activity (ibid.).

Communication skills

Also, communication is facilitated especially through on-farm adaptive research and group meetings. Presentation skills and techniques are trained within group meetings. For instance, smallholder farmers presented the data of the field trials using different presentation material. As also results from Najjar (2013) shows, this study indicates, that the encouragement to talk in front of a group of people can push self-confidence of participating farmers. Especially for women and people from disadvantaged castes, active participation through presentation in the smallholder farmers' collectives was partly a new experience.

Communication was facilitated through a regular contact of smallholder farmers. Meetings enabled experience exchange between smallholder farmers, in between different smallholder farmers' collectives and between smallholder farmers' collectives and Caritas project staff. Not only the quantitative increase of contacts but also the willingness and motivation of smallholder farmers to foster contacts, lead to communicative learning in the study sites. In accordance with results from the study of Najjar (2013), results show that participatory approaches can entail communicative learning through activities focusing on partnership, collaboration, dialogue, social- and co-learning, conflict management and reaching consensus (Najjar 2013).

Analytical capacities

Through the interpretation of collected data of the on-farm adaptive research, skills like methodological awareness and analytical capacity of male and female farmers in the study sites were strengthened. Farmers needed analytical skills when they were monitoring and assessing the quality of their land and their products especially when for instance ecological challenges increased. As also Berg & Jiggins (2007) indicates, this study shows that through a focus on critical thinking skills, farmers' self-reliance can be increased which enables them to react better to increasing challenges.

Concepts

Further, smallholder farmers were increasingly aware of concepts like sustainability, empowerment, leadership and gender equality. Partly, gender roles were increasingly reflected and questioned in the study sites. The involvement of gender issues in diverse project contexts can help to work towards gender equality (IITA 2010).

6.3.3 Learning impacts

Based on the data analysis, realized and potential impacts of SAF-BIN are presented in the following. Most of these impacts can only be anticipated because the SAF-BIN project was not finished at the time this study was conducted. Partly, links are drawn between impacts and learning outcomes. To draw these links is not always possible, because of the complex interplay of learning outcomes, impacts and socioeconomic, cultural and environmental factors. Thus, the links that are presented in the following should be understood as possible impacts.

Table 10: Realized and potential impacts

REALIZED IMPACTS	Notable gender aspect
Production increase	Women empowerment and the empowerment of people from disadvantaged castes
Saving networks	Especially women are participating in the networks
Increased reflection of gender roles	Men and women reflect what it means to be a man or a woman
POTENTIAL IMPACTS	Notable gender aspect
Change of gender roles	Increased perspectives for women can change roles towards more equality
Resilient farming systems	Women get economically more independent
Change of traditional knowledge	-
Healthier society	Increase of women's health awareness
Commercialization of farming; upscaling	Women increase their income
Change of acceptance of farming in the communities	-
Job migration decreases	Men have perspectives regarding income generation within the community

Source: Own data

Production increase

An increase in crop production and the establishment of saving networks in the smallholder farmers' collectives are partly realized impacts of SAF-BIN. Through technical and communicative learning outcomes in the fields of cultivation practices, improved management skills and communication, some smallholder farmers achieved an increase of crop production. Thus, results show that especially the

combination of a range of learning outcomes can lead to long-term changes (impacts).

Saving networks

In some smallholder farmers' collectives, smallholder farmers collect a small amount of money from every group member on a monthly or weekly basis. If a member needs a loan to e.g. buy inputs, invest in the farming system or for emergencies, he or she can take a micro-credit with low-interest rates.

Microfinance is one way to fight poverty in rural areas. People with little income in developing countries are seldom able to obtain loans from formal financial institutions. This makes the need for alternative ways to get access to basic financial services such as credit and insurance, apparent. Although the financial amounts are rather small, microfinance can be an opportunity for people from rural areas to invest in farming and to have a safeguard to crisis (IFAD 2014).

Increased reflection of gender roles

Through discussions in the groups, people reflect what it means to be a man or a woman. Analyzing data and discussions about it lead to the notion of men, that women are actually smart. Also women increasingly reflect their role. Although men are abroad, they are still in charge of decision making. Through reflection and discussion about this phenomenon in the groups, women increasingly reflect on their roles. Bottom-up approaches have the potential to empower the participants, which enable them to react better to increasing challenges (Duveskog 2006; Berg & Jiggins 2007; Duveskog & Friis-Hansen 2009). In Nepal, women's participation in development programs had already initiated women at leadership positions in the past and increased decision-making by women (Gautam 2004). This results in a change of their social status (Fawcett & Regmi 1999; Farming First 2013).

Potential future impacts are: food security of the smallholder farmers' collectives and the surrounding population, change in traditional knowledge and change of acceptance of farming in communities, healthier smallholder farmers, commercialization of products, change in cooking habits and a decrease of job migration (Table 10).

Higher agricultural yield

Data show, that learning about cultivation practices and the achievement of communicative learning outcomes result in higher agricultural yield in the long run, which is needed to achieve food security (Tiwary 2005; IFAD 2009). This is in line with results from Najaar (2013), which indicates that impacts resulting from participatory development approaches were, for instance, an increase in food security (Najaar 2013).

The data analysis shows that technical and communicative learning support empowerment of smallholder farmers. Communicative learning outcomes like presentation skills, a profound network, decision-making skills and self-confidence can especially support empowerment of women.

Changes in traditional knowledge, Change of acceptance of farming in the communities

Changes in traditional knowledge refer in this study to the risk of the loss of traditional seeds or cultivation practices through the application of new technologies. This can go along with an increasing dependence on institutions (e.g. NARC) in terms of seed supply. On the other hand, changes in traditional knowledge refer in this study, to a revival of traditional knowledge through experience sharing of smallholder farmers that can lead to increasing knowledge of smallholder farmers.

In any case, local knowledge and indigenous practices should be the basis of any further activities in participatory approaches (IITA 2010).

Healthier society

Learning outcomes can impact human health in the study sites. Increasing knowledge about effects of chemical fertilizers and pesticides, knowledge about balanced diet and the nutrient content of foods, and health awareness can impact human health in the study sites. Especially female farmers have an interest in human health as they handle family health and food supply. Some of them even act accordingly in their daily activities e.g. some smallholder farmers report changes in cooking due to increasing health awareness and because they have more ingredient options going along with diversification in farming.

Since the reproductive role including domestic work and taking care of the family and the community-managing role is usually women's role, this potential impact concerns primarily women (Moser 1993; ITCILO 2013).

Commercialization of farming

Further, commercialization of farming and up scaling can be stated as potential impacts. Possible activities along the production chain are increasingly identified and partly applied in the study sites e.g. selling surplus products at the market.

Going along with it, change of acceptance of farming in the communities can be a potential impact. It is not clear if a commercialization leads to more or less acceptance of farming in the communities.

Increases in production, which can generate income are needed to achieve food security (IFAD 2009). Men tend to take over the control when agriculture production systems are commercialized and when processes become more capital intensive (Bhadra & Shad 2007). Women might lose control over agricultural production systems.

Job migration

Finally, the project might have an impact on job migration on a small scale in the study sites. Some female smallholder farmers report that possibly men will be able to return if sufficient income can be generated in farming. If smallholder farmers' perspectives are increased in Nepal and if they can make their living within the community, the necessity to go abroad is decreasing (Wesendrop 2012).

The potential impacts will heavily depend on other factors such as the emergence of social and climatic extreme events (Slater et al. 2007; IFAD 2009; Westendorp 2012). For instance, the decrease of job migration also depends on the attractiveness of the established jobs in Nepal. Also, the achievement of food security heavily depends on weather conditions.

7. Conclusions & outlook

This study shows that project activities within the action research and development project *Strengthening Adaptive Farming in Bangladesh, India & Nepal* (SAF-BIN) bear a high potential to enable transformative learning. Through a range of project activities, elements of transformative learning such as dialogue, critical reflection and individual experience were facilitated for smallholder farmers.

Social barriers e.g. low social status, are factors that hinder the access of women to project activities. SAF-BIN strongly promotes the access of marginalized smallholder farmers such as women or disadvantaged castes and ethnic groups through encouraging them to participate when the smallholder farmers' collectives were composed. The promotion of access is a core factor for gender-sensitiveness and a precondition for achieving learning outcomes. Access for women could also be ensured aside from the target group (smallholder farmers) e.g. facilitating access for women to male-dominated position within the project.

Within the action research and development project, a range of learning outcomes in the field of agriculture and climate change adaptation was achieved. By including aspects in the project interventions that were not core activities for women before, their capacities were increased, which can impact the gender relations.

Due to diverse gender roles, learning outcomes differed between men and women (men were more likely to achieve technical learning outcomes, women more likely to achieve communicative learning outcomes). It can be concluded, that determined gender roles highly influence what people learn. At the same time, transformative learning can impact gender roles.

In order to examine the potentials of diversity for transformative learning, more research is needed. Results of this study indicated, that mixed smallholder farmers' collectives regarding different socioeconomic factors facilitated elements of transformative learning. Those are collectives, in which people with diverse social backgrounds regarding caste, marital status, age and education participated. Due to diverse experiences in mixed groups, dialogue and critical reflection were facilitated. Participants reflected for example rather on the roles of people from disadvantaged castes in mixed groups regarding different socioeconomic factors. Thus, the potentials of high socioeconomic diversity regarding gender and other socioeconomic

factors for transformative learning in action research and development could be subject of future research.

Observations and interviews with participating farmers' further indicated, that project activities facilitated elements of transformative learning also for project staff and non-participating farmers. The project provides an environment that potentially facilitates learning not only for the target group, but also for other stakeholders. More research is needed in order to examine the potentials of transformative learning for non-participating farmers and other stakeholders.

It can be summarized that action research and development projects like *Strengthening Adaptive Farming in Bangladesh, India & Nepal* (SAF-BIN) present a fruitful environment for transformative learning.

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Annexe

I. Example of comprehensive structure analysis according to Lueger (2010)

Code	Text phrase	Paraphrase	Context of statement		Hypothetical context of the effects	
			Text frame	Living environment/ Social world	Effects of interaction	Effects of systems
<i>Instrumental learning outcome/ Cultivation practices & inputs</i>	<i>I15: [...] I used to do traditional practices from cultivating to harvesting. And so on, which is not economic. And as we did trials to compare the own practices and improved practices, I found that improved practices bring better yield. [...]</i> #00:30:47-7#	In the past, traditional practices were used in different production stages, which are considered as not to be economic. Trials were conducted with improved practices that increase output.	SHF compares based on past experiences, he/she thinks previous behaviour/ knowledge is relevant for his/her learning processes	It has to be economic, economic thinking is instruction of action, A lot of yield = desired SHF check the outcome of the trials on his own, He/she assesses the trial based on the yield	In the context of economic thinking and behaviour, the results of the trials are accepted positively Differentiation of new and old	Trials influence farming practices Yield can be increased through the project It is fruitful if interests of smallholder farmers are respected/considered

II. Interview guide

Interview guide		
	Caritas coordinators	Smallholder farmers
Introduction	<i>Introduction to the research content</i>	<i>Introduction to the research content</i>
Opening Question	<i>Could you briefly introduce the project? Could you describe your role in the project?</i>	<i>Could you briefly introduce the project? Could you describe your role in the project? Who is in charge of your farm? Which parts of the farm are addressed within the project?</i>
Subject area 1: Project Organisation/ Project activities	<i>How does a typical project meeting look like? Who is involved in the project? With who of the project do you most closely cooperate? Do you have regular contact with other people involved in the project? Is there anyone missing, who should have been part of the project?</i>	<i>How does a typical project meeting look like? Which whom are you in regular contact regarding the project? To which degree do you communicate with these people? What does your family think about the project? Are there many project like SAF-BIN in the region? If yes, which of those are the best and why?</i>
Subject area 2: Processes/ Outcomes	<i>What did you learn from the process (in regard to technical outcomes/ skills)? What do you expect regarding the project outcomes? What is really good about the project? What would you do differently next time?</i>	<i>What did you learn from the process? What do you expect regarding the outcomes? To which extend are your agricultural activities changing due to the project? How does climate change affect your farming activities?</i>
Subject area 3: Impacts: Gender Tradition Inclusion	<i>What does gender mean to you? To what extent has gender aspects been addressed in the project? How many women participate in the project? In which way has the every-day-life of the SHF changed since they joined the project (f.e. cooking habits, seed trading)? To which extend are also the family members included in the project? In which way can the project influence the future life of the farmers' children? How was the selection of project farmers going on?</i>	<i>In which ways your every-day-life changed since you joined the project (f.e. cooking habits)? If you talk about the project with your family, what are you talking about? Do you want your children to learn about it too? Which impact the project has had on your community, the family? Will you attend the project till the end (2016)? Do you know someone in the area/neighborhood who would like to participate in the project and does not?</i>
Subject area 4: Recommendations	<i>What would you change, if you would be in charge of the project conception and the project would just start?</i>	<i>If you were the leader of the project, how would you organize it? What kind of wishes do you have regarding the project?</i>

III. Trial descriptions

1. Wheat trials I: Broadcasting vs. line sowing

In the VDC Kalika, wheat trials were organized in two plots. In the plots, “farmers practice” and “improved practice” were applied. In “farmer practice” the wheat was cultivated in a traditional way, while “improved practices” involved the application of new farming practices and inputs. Hence, local practices were opposed to innovative practices. The same variety of seeds was broadcasted under "farmers practice", and line-sown under "improved practice". After comparing the collected data in the group meetings, line sowing was found to result in higher yield, higher plants, more spikes, less insect based problems and easier manual weeding.

2. Wheat trials II: Testing new varieties

In the VDC Kalika, new seed varieties were tested and compared with traditional/local seeds. The new seed variety called “Gautam” was released by NARC and distributed by Caritas Nepal. “Gautam” was found to be more drought-tolerant, which can facilitate the cultivation in the context of increasing water scarcity. In comparison to local varieties, here the “improved practice” result in higher yields, higher plants, more spikes, less insect based problems and easier manual weeding.

3. Wheat trials III: Soaking seeds

Another group in the VDC Kalika analyzed the impact of soaking seeds. The treatment of soaking the seeds was opposed to plots, where the seeds are not soaked. It was found that soaking the seeds for about twelve hours in water results in higher yield.

4. Vegetable trials I: Mulching techniques

Another group in the VDC Kalika undertook two types of vegetable trials. Firstly, different types of mulching techniques were tested. Two plastic mulches (thin vs. thick) such as mustard and straw mulches were tested. SHFs observed the impacts of different mulching material on soil moisture, weed growth and yield of the vegetable grown.

5. Vegetable trials II: Irrigation

Secondly, a group in the VDC Kalika conducted irrigation trials in the drought areas. With the aid of tanks provided by Caritas Nepal, drip irrigation in combination with plastic mulches for vegetable production was tested. Participants found that the use of mulches in combination with drip irrigation had benefits such as faster growth, improved crop quality and soil moisture retention.

6. Vegetable trials III: Tomato tunnels

Tomato trials were conducted by two SHFCs in the Dhikurpokhari. Figure 9 shows a member of a SHFC in her tomato tunnel supported by the project in Dhikurpokhari. Tomato tunnels were built on suitable, easy accessible land of a group member. Due to the management possibility of humidity and temperature, an increase in tomato production, a reduction of diseases and an improvement in fruit quality were expected.

7. Varietal wheat trials

Further, varietal wheat trials were conducted in one group in Dhikurpokhari. Three different varieties ("Gautam", "Gaura" and a "Local variety"), were tested in nine plots (three plots for each variety). Further, chemical fertilizers were applied in a "recommended dose" and the yields were compared. It was found, that the yield of the varieties differed and that fertilizers had an impact on crop production.