

**CGIAR Research Program on
Climate Change, Agriculture and Food Security (CCAFS)**

**Village Baseline Study:
Site Analysis Report for Haryana - Karnal,
India (IN1741)**

February 2014

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The tools and guidelines used for implementation of the village baseline study across all CCAFS sites, as well as the mapping outputs at a higher resolution can be accessed on our website (<http://ccaafs.cgiar.org/resources/baseline-surveys>).

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Abstract

This is the report of the village baseline study of Pakhana in the CCAFS benchmark site of Karnal, India conducted from March 15-17, 2013 to complement an earlier household baseline survey done in the same village.

Pakhana is located in the fertile flat land of the Indo-Gangetic plains and has good access to roads, markets, electricity and communication. The community has not experienced a food crisis and 90% of the population enjoys year-round food security. Pakhana benefited from the Green Revolution and has adopted improved varieties and the use of chemical fertilizers and pesticides. However, Pakhana now faces challenges resulting from population growth, deforestation, reduced and variable rainfall, declining soil fertility and organic matter, monocropping, over application of chemical inputs, and depletion of the water table. As a result, access to water resources is more difficult, profits have decreased and production is constrained. Without adjustments, Pakhana's food security, livelihoods and natural resources will be further strained and threatened.

Men and women identified 18 organizations supporting microfinance, education, health, food distribution, water resources and community development. The majority of food security related organizations are focused on food availability and to a lesser extent food access and utilization. There are lower levels of support for production and market related activities, with the majority of support focusing on direct feeding of vulnerable populations and access to credit. NRM related organizations were few and those in operation had limited NRM or climate change engagement and were focused on agriculture or livestock. All identified organizations were categorized as weak and suffering from corruption and a lack of funds and human resources. Men and women questioned their effectiveness and capacity to meet their needs.

The groups identified 19 sources of information on production, markets, weather, health and nutrition, livestock, and climate change. The population benefits from existing facilities such as phones, mobiles, electricity, television, radio and transport. Farming was the most sought after type of information by men, followed by climate change and equally weather and prices. Women reported accessing the same quantities of all types of information. The most popular sources of information were friends, relatives, neighbours, radio and television. Other options such as price information via mobile phones were identified but used less frequently. Women noted their lack of mobility and literacy limited their access to sources of information.

Recommendations focus on improving soil fertility, water availability, farm profitability, opportunity expansion, and climate change mitigation. With improved access to assistance and capacity building that meet local needs, Pakhana is well positioned to effectively address its evolving conditions.

Keywords

Baseline; India; village study; participatory mapping; organisations; access to information

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Contents

| | |
|--|-----------|
| Abstract | 2 |
| Keywords | 2 |
| About the Authors | 3 |
| Contents | 4 |
| Introduction | 5 |
| Data analysis | 8 |
| Topic 1: Community resources – participatory satellite imagery interpretation and visioning | 8 |
| A. Current resources | 8 |
| B. Gender-differentiated comparison of current conditions..... | 13 |
| C. Major changes of resource conditions..... | 14 |
| D. Vision of the future..... | 17 |
| Topic 2: Organisational landscapes | 19 |
| A. Basic spheres of operation | 19 |
| B. Organisational landscape of food security | 24 |
| C. Organisational landscape of natural resource management | 25 |
| Topic 3: Information networks | 28 |
| Conclusion and recommendations | 30 |
| Implications for CCAFS | 31 |
| Recommendations for major opportunities | 31 |

Introduction

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a strategic ten-year partnership between the Consultative Group on International Agricultural Research (CGIAR) and Future Earth to help the developing world overcome the threats posed by a changing climate, achieve food security, enhance livelihoods and improve environmental management. In 2010, CCAFS embarked on a major baseline effort at household, village and organisation levels across its three target regions, namely East Africa, West Africa and South Asia (more information about CCAFS sites is available on our website <http://ccafs.cgiar.org/regions>). CCAFS trained survey teams from partner organisations in the three regions to conduct the baseline.

The baseline effort consists of three components – a household survey, village study and organisational survey. The household baseline survey, a quantitative questionnaire on basic indicators of welfare, information sources, livelihood/agriculture/natural resource management strategies, needs and uses of climate and agricultural-related information and current risk management, mitigation and adaptation practices, was implemented by CCAFS partners in 35 sites (245 villages) with nearly 5,000 households in 12 countries to date. CCAFS partners are implementing village baseline studies (VBS) and organisational surveys in one out of the seven villages within each CCAFS site where the household survey was implemented. The plan is to revisit these villages in roughly 5 years, and again in 10 years, to monitor what changes have occurred since the baseline was carried out. The goal is not to attribute these changes to the program, but to be able to assess what kinds of changes have occurred and whether these changes are helping villages adapt to, and mitigate, climate change.

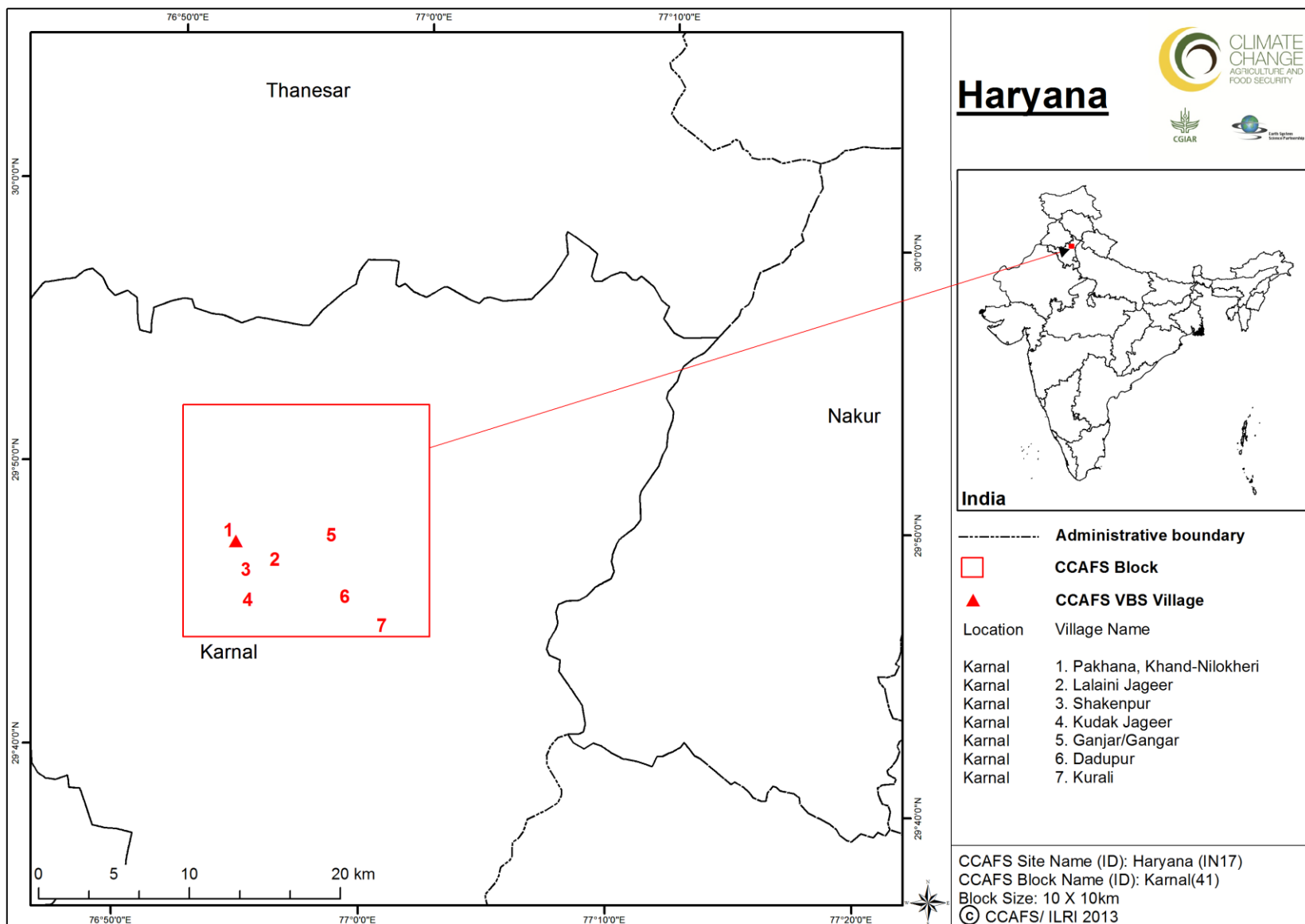
The focus of this site analysis report is the VBS. To date, 17 VBS were conducted. The VBS aims to provide baseline information at the village level about some basic indicators of natural resource utilisation, organisational landscapes, information networks for weather and agricultural information, as well as mitigation baseline information, which can be compared across sites and monitored over time.

The objectives of the VBS are to:

- Provide indicators to allow us to monitor changes in these villages over time. In particular, changes that allow people to
 - Manage current climate risks,
 - Adapt to long-run climate change, and
 - Reduce/mitigate greenhouse gas emissions
- Understand the enabling environment that mediates certain practices and behaviours and creates constraints and opportunities (policies, institutions, infrastructure, information and services) for communities to respond to change
- Explore social differentiation:
 - Perceptions of women and men will be gathered separately to be able to present different gender perspectives.
 - Focus group participants will be selected to present perceptions of groups differentiated by age.

The detailed tools and guidelines used for the implementation of the VBS across all CCAFS sites, as well as the manuals, data and analysis reports can be accessed on our website (<http://ccafs.cgiar.org/resources/baseline-surveys>)

Map 1. Location of the Pakhana village in the CCAFS benchmark Karnal site, India



This report presents the results of the VBS conducted on March 15-17, 2013 in the village of Pakhana, India (Karnal site) (Map 1). Pakhana is located in the Karnal district of Haryana state and situated in the fertile flat land of India's Indo-Gangetic plains. The village has access to roads, electricity and communication. The district headquarters of Karnal is about 16 km away from Pakhana. The Pakhana location was selected for the village survey following completion of a household survey at the same site and because of its relative central location in the block. The survey team was composed of two facilitators, two note takers and two translators. Each pair was male and female. Consultations were made with the village authorities concerning time and place of meeting. They selected an appropriate venue in Pakhana for the meeting.

Invitations were sent out by the site team leader to three sets of participants who were chosen using random sampling. Each group was composed of 15 men and 15 women. Three consecutive days were selected for the survey and on each day only one set of participants were expected to participate in the survey. The whole community was invited on the first day of the survey for an introductory session where this survey was explained to and results of an earlier household survey shared. After the introductory session the rest of the community was set free and only the invited group of 15 men and 15 women remained behind to carry on with the survey. This was repeated at the end of the third day when the survey was completed. The whole community was again invited to attend a debriefing session where summaries of the findings were shared.

The survey used participatory methods of data collection. Throughout the data collection process groups of male and female members of the community worked separately. This was to allow for collection of gender-differentiated information.

The task on day one was to introduce the community group to a satellite image of the block and work with each group to identify and map/sketch resources that are important to the community, their current state, their past state and what caused the changes. The outputs were maps and sketches. The process of working with the community to identify the resources that are important to them depended entirely on how well they were able to understand and interpret the image.

The task on day two was to work with each group to understand the organisational landscape and the links that exist between the organisations in relation to food security in a normal year, in a year of crisis and in relation to natural resource management. The outputs were diagrams showing the organisational landscape. Information on each organisation was also captured cards. The links between the organisations were shown using lines and arrows on the diagrams.

There were two main tasks on day three. One was to work with each group on understanding information networks in relation to weather elements and farming activities. The outputs were diagrams. The second task was to bring the two groups together and generate a vision of what the community would like their village to be like in the future. The output was a map/sketch showing "the vision of the community."

Information generated from the survey was captured on sketches, maps, flip charts, information cards and notes, which were brought together in an initial debriefing and ultimately this final report. Photographs were also taken of all the activities and information generated at each stage. The survey materials were then labelled and packed for off-site processing. The debriefing report was prepared in the field so that it could benefit from the presence of the site team. The photographed sketches and maps were inserted in the debriefing report. In this site analysis report proper maps and diagrams derived from the field outputs replaced them.

Data analysis

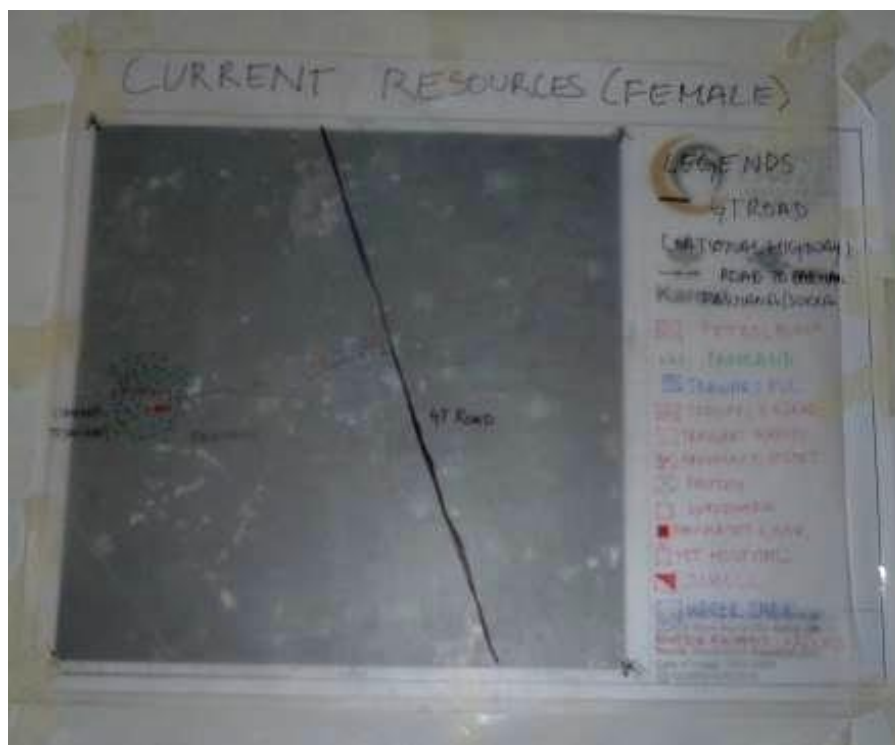
Topic 1: Community resources - participatory satellite imagery interpretation and visioning

Community infrastructure and resources and gender-differentiated access and utilisation of those resources have been analysed, based on a process of participatory visual interpretation of high resolution satellite imagery (RapidEye). The aim was to create a basic understanding of existing community resources, as well as of community dynamics in relation to its environment. The participants discussed the current state of those resources, in terms of quality, access, management, history and potential drivers of change. Later on, a mixed group developed an image of village resources and human well-being into 2030 to understand opportunities, constraints and aspirations for the future. The detailed approach to this exercise is outlined in the CCAFS Village Baseline Study Implementation Manual (follow the link to the baseline study from our website <http://ccafs.cgiar.org/resources/baseline-surveys>).

A. Current resources

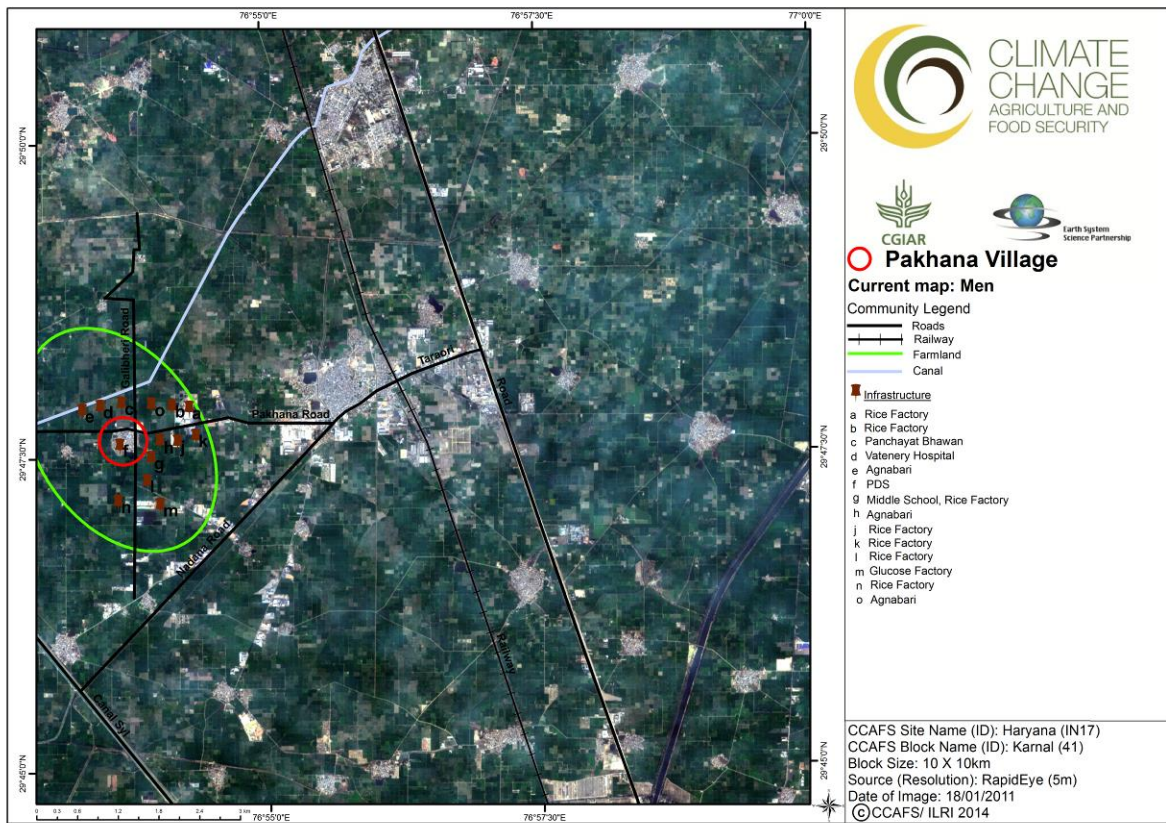
Separate meetings of male and female participants took place in Pakhana. To begin the identification of community natural resources and infrastructure, groups generated initial diagrams on the floor as a basis for discussion and consensus before final versions were transferred to flipcharts by the research team (Photo 1). Following this activity groups were shown satellite imagery of their region to compare and confirm their maps. The appreciation of scale was important for participants to get their bearings. The exercise could not be rushed and took a few minutes, but both groups were ultimately able to identify key features from the images.

Photo 1. Current conditions mentioned by women regarding natural resources and infrastructure



Maps 2 and 3 represent the current conditions in the community regarding natural resources (water, forest, grazing, farmland, degraded land) and infrastructure (roads, markets, education, health) according to, respectively, male and female participants. The maps lay out information prepared by the community participants super-imposed on a satellite image.

Map 2. Men's map of current community resources



Map 3. Women's map of current community resources

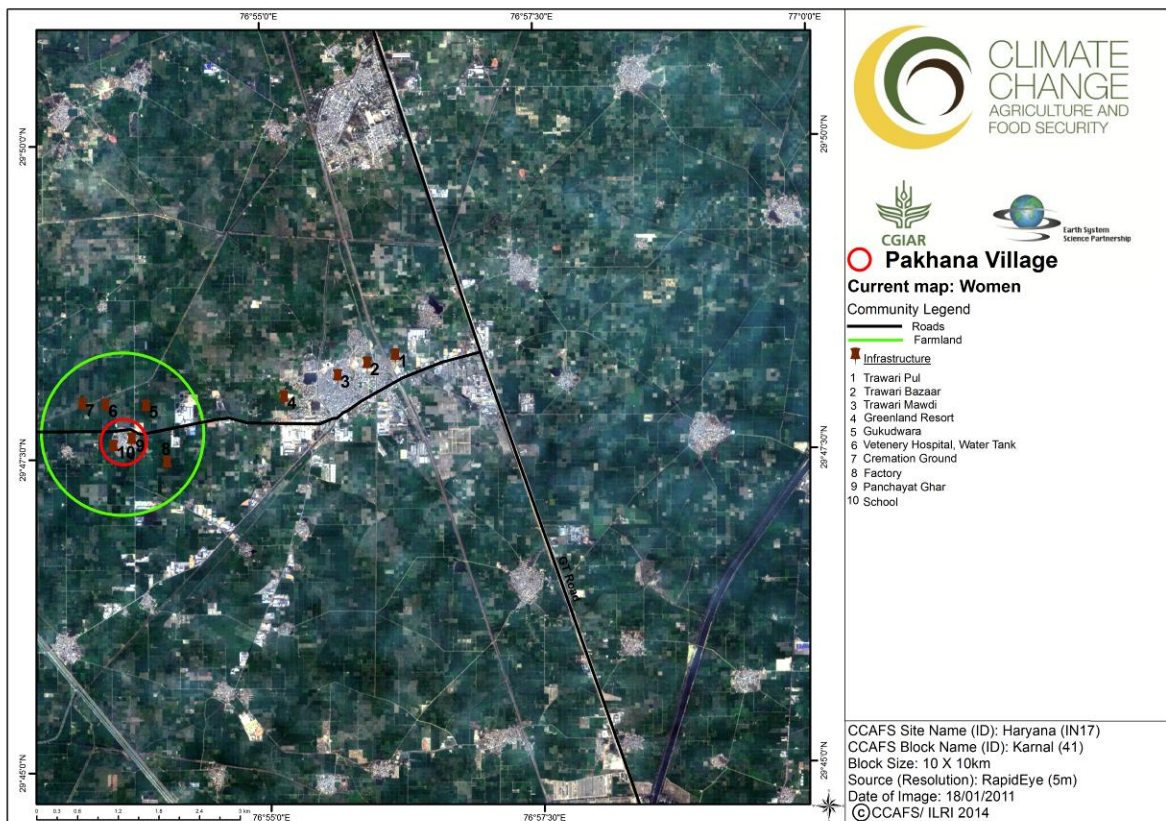


Table 1. Summary for Layer 1: current conditions, as perceived by men (M) and women (F)

| Land cover class | Community determined land use | Location Names | Current state (quality) | Time to resource | Mgmt and ownership issues | Environmental Benefits | Opportunities | Limitations |
|-----------------------|---|-------------------------------------|--------------------------------------|-----------------------|---------------------------|--|---|-------------------------------------|
| Gurudwara (M) | Worship, communication, social and developmental purposes | Pakhana | Good | 1 minute | Community | Centre for announcing village clean up | Mobilize community for future works | Lack of funds |
| Gurudwara (F) | Religious purposes | Pakhana | Functional | 5 – 10 minutes | Community | | | |
| Temple (M) | Religious purposes | One in Jalpura and three in Pakhana | Good | 1 – 5 minutes | Community | | | |
| Temple (F) | Religious purposes | | Functional | 5 – 10 minutes | Community | | | |
| Ponds (M) | Irrigation and drinking water for animals | Pakhana | Not satisfactory | 2 - 5 minutes | Community | Irrigation and drinking water | Clean up and better manage water resources | Not hygienic |
| Canals (M) | Potential water resource but community has no access | Pakhana | Varies depending on season | Passes by Pakhana | Government | Improving greenery and crop production | Better if available throughout the year | No support from government |
| Canals (F) | Water resource | Pakhana | Semi functional | 20 – 30 minutes | None | Water | Water for rice cultivation | Dries out after 2 – 3 months |
| Wells (M) | Drinking water | Pakhana | Best water quality for drinking | 2 – 3 minutes | Government | Clean drinking water improves health | Healthy people may improved environmental resources | |
| Water Tank (F) | Drinking water | Pakhana | Functional | 10 – 15 minutes | Community | | Drinking water for village | |
| Farmland (M) | Agriculture production | In and around Pakhana | Fertile, irrigated and high yielding | In and around Pakhana | Private | Greenery | Export promotion and employment generation | Drainage water |
| Farmland (F) | Agriculture production | Multiple locations | Large landholdings. Functional | 5 - 25 minutes | Private | | Access to food | Production for consumption and sale |

| Land cover class | Community determined land use | Location Names | Current state (quality) | Time to resource | Mgmt and ownership issues | Environmental Benefits | Opportunities | Limitations |
|-------------------------------------|--|-----------------------|--------------------------------|-------------------------|----------------------------------|-------------------------------|---|-----------------------------------|
| Cremation Grounds (F) | Last rites for the dead | Pakhana | Functional | 20 minutes | Community | | | |
| Roads (F) | Transport to Karnal, Haryana and area villages | GT Road | Functional | 30 – 45 minutes | Government | Irrigation and graze land | Access to education, health, and other services | |
| Primary School (M) | Education | Pakhana | Good | 1 minute | Government | Education improves awareness | Education improves awareness | Quality education |
| Secondary School (M) | Education | Pakhana | Good | 1 minutes | Government | | | |
| Secondary School (F) | Education | Pakhana | Functional | 5 – 10 minutes | Government | | Access to education for boys and girls | Only up to class 7 |
| Saraswoti Private School (F) | Education | Pakhana | Functional | 10 – 15 minutes | Private | | Access to education for boys and girls | Expensive and only up to class 10 |

Male and female participants provided the following information on their community's resources, including infrastructure (building on Table 1).

Gurudwara: The common place of worship for the Sikh communities that dominate the village. It is also used for communication, social and developmental purposes.

Forest: There is no forest area or tree coverage in the area, however some farmers noted they have a few trees around their farmland. Tree planting is not common and neither is fruit cultivation.

Water: There is an absence of rivers in the area, however villagers have access to water through bore holes. These tube wells are the main source of irrigation but the water level has gone down to 70-80 feet during last 50 years. A natural canal also provides water for 2-3 months, however it runs dry after the rainy season. A huge government irrigation canal passes through the village but farmers have no access to it. The community has a pond but it's not usable apart from animal drinking water and is drying out.

Farming: The village is located in the agriculturally developed region of Indo-Gangetic plains. Agriculture is the main occupation for a majority of households, however salaried jobs and businesses also contribute significantly to household income for about one-fourth of area households. There is no solely subsistence level farming in Pakhana. Farmers are practicing intensive crop production, with rice and wheat the dominant crop covering 90% of gross cropped area in Pakhana. The village is in one of the two major rice exporting states in India and there are 8 rice mills in and around Pakhana. Fodder is the third most important crop in the area. Commercial vegetable cultivation by farmers has recently started and tomato is the most important crop. About two-thirds of surveyed households grow 4-6 crops, indicating a low level of crop diversification. Almost all farmers use chemical fertilizers and pesticides in crop production. It's also common for farmers to hire agricultural machinery and farm labour for crop and livestock production. The whole state is doing fully mechanized farming since the Green Revolution, which includes using a range of machines for ploughing, planting, input application, weeding, harvesting and transportation. Farmers are very progressive adopters of new agricultural technologies and the majority of studied households reported alternating 2-3 crops/varieties, mainly due to changing market and climate conditions.

Livestock: Livestock production is the second most important economic activity in Pakhana and more than 90% of households are engaged in mixed farming of crop and livestock. The majority of households market crops and milk and own 2-3 dairy animals. Production is constrained by lack of breed diversity, limited grazing opportunities and rising costs. Animals are typically grazed in the agricultural fields during the off-season.

Land: About one-fifth of households own less than one hectare of land whereas more than one-fourth households own more than 5 hectares. There is almost negligible community land since much of the area was converted into new settlement farmland following independence and the area's shift from West Punjab (now Pakistan) to the Indian state of Haryana.

Markets: Given the dominance of rice in the area it is highly traded and processed. Some wheat is exported but it is mostly consumed. All the rice produced is exported all over India and abroad. There are several big rice factories in the Pakhana community. The major grain market, called Anaj Mandi (Grain Market), is located in nearby Tarawadi, which is 16 km from Karnal and connected by a paved road.

Roads: Pakhana has good road access for transporting inputs and products to and from the village and market. The village has an internal road system and is also connected to national high ways, thus to big Indian cities as well as those in Pakistan and other countries. The marketing of the agricultural products is not a problem for area farmers. Big trucks and sixteen wheelers are used for the transport of produce to local markets during the high season.

Health: Healthcare is limited in Pakhana. Women noted there is no maternity hospital within or nearby the village, which causes difficulties during childbirth.

Schools: The Pakhana literacy level is more than 90%, however it varies among classes and women and overall there is a dearth of qualified people in the area. The area schools only go through class

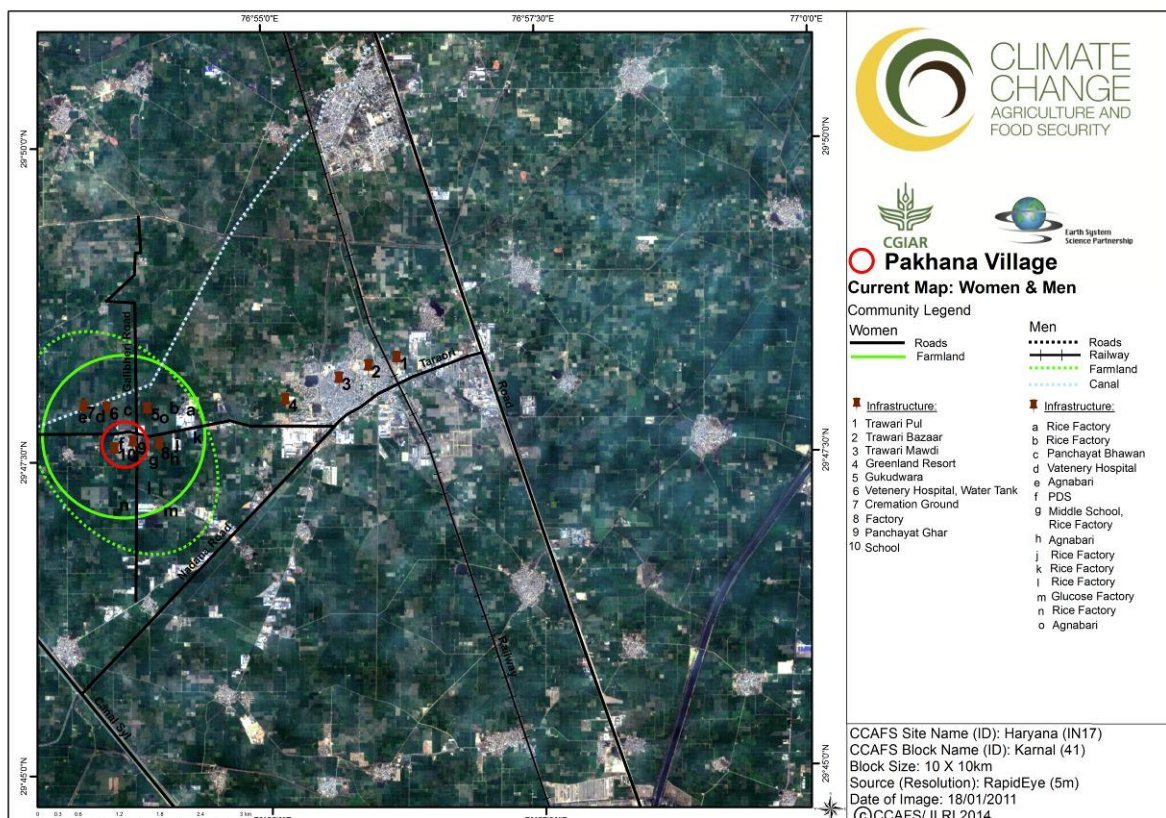
eight. Due to a lack of higher education facilities in the community, both male and female students must go to Karnal or other parts of Haryana to attend college and university. Women expressed dissatisfaction, saying that this puts them at a disadvantage given they are not allowed outside the community by family. Many women felt this was the reason they were not highly educated.

B. Gender-differentiated comparison of current conditions

As seen in the table above, it is evident that the views of male and female village members on the present resources were similar except few differences. Men and women noted many of the same resources, such as the Gurudwara, canals, farmland and schools. They differentiated water resources with the men also noting wells and ponds while the women cited only water tanks. Women listed roads while the men did not, particularly noting they provided access to health and education services. Both the groups were concerned about farmland that was ever costlier to farm and were interested in expanding livestock production. Men and women were not happy with the present situation of rising temperatures and less rainfall, however they were not all conscious about climate change impacts. Men spoke more about climate change than women. Having help to address their current resource constraints and challenges as soon as possible is important to both groups. Overall, women were more concerned about farmland, schools and health clinics while men focused more on agribusiness and transportation related resources. Map 4 shows the comparison of the current resources noted by men and women.

The women's group was comprised largely of women from the poorer classes who were uneducated and less aware and talkative, particularly in front of men. They were mostly not from land-owning households and worked as wage labourers. Many women claimed to have little information on farming systems and from outside their immediate surroundings. The women participants usually arrived fairly late to the survey sessions and were unwilling to stay as they had a lot of work at home and in the fields. Many did not participate actively during the sessions and comments were frequently given by a smaller number of the women present. Men also expressed challenges staying for survey sessions given workloads. Both groups did, however, actively provide information and participate in discussions.

Map 4. Overlay of current conditions, comparing men's and women's maps



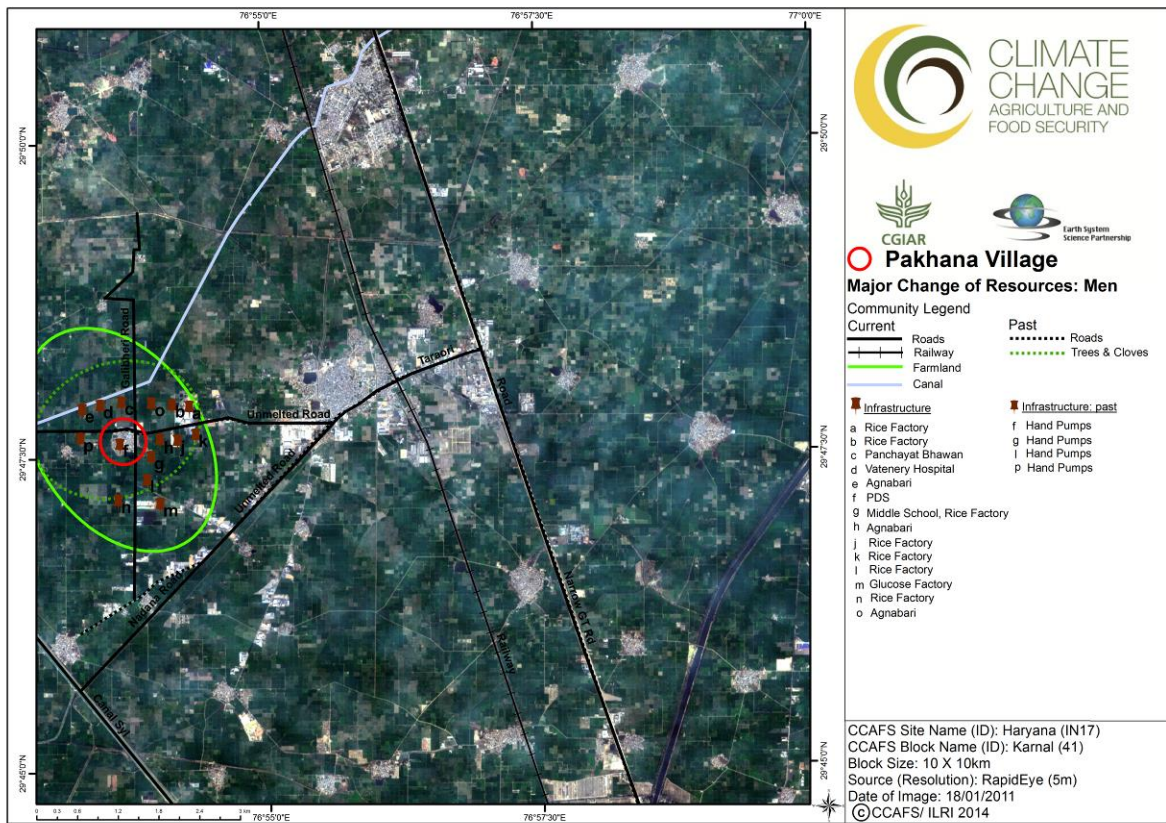
C. Major changes of resource conditions

Maps 5 and 6, and Table 2, show the most relevant changes in community resources as expressed by male and female participants.

The major changes for the men and women of Pakhana are production intensification, deforestation, tenuous water resources and decreasing soil quality. Pakhana was primarily a poor farming area in the past. During the partition of India and Pakistan in 1947, all Muslims in the community migrated to Pakistan and many Sikhs came from Pakistan to resettle the area. This enterprising community then developed farmlands, deforesting the dense forests in the 1950s. Farmers said that there was some forest in the past, consisting mainly of big mango trees. It was closer to the village and full of birds and many kinds of animals that are not there now. The forest provided them with timber and firewood for household consumption. It also provided them with lots of organic material that made their soils rich, resulting in good organic yields without the use of chemicals. By the 1960s, the entire state of Haryana, including Pakhana, had become a net exporter of cereal crops. High crop production is attributed to the use of full inputs, latest technologies from the Green Revolution era, and the adoption of fully mechanized farming methods. The canal used to be the main source of water for villagers and farmers noted there used to be lots of water for irrigation. They said that the rains would come timely and were always plentiful.

Pakhana is now starting to face difficulties they attribute to population increases, rising temperatures, less plentiful and more erratic rainfall, loss of soil organic matter, excessive boring, and poor water access. Due to monocropping, many decades relying on Green Revolution technologies, and loss of organic matter from forests, soil quality has gone down drastically. The use of chemical fertilizers is a must now for farmers. Pesticide usage has also eliminated most insects, including those that could be of benefit to farmers. The canals that used to provide drinking and irrigation water are now mostly dry. A big government irrigation canal continues to flow by the village, however farmers are not allowed access. As a result, farmers must now rely only on tube wells and ground water to meet their needs. The water table a few decades ago was very good and sufficient water was found at less than 10 meters. Now the ground water table has significantly gone down, making irrigation more difficult and costly. The available water in some areas is also dangerous due to heavy metals like lead and arsenic, which has negative health impacts for humans and livestock when ingested. The water table decline is due to overuse for irrigation and demand outpacing rainwater's capacity to recharge aquifers. As a result of these dynamics farmers are now facing big problems with the cost of agriculture and livestock production, making farming not a good business. Farmers in Pakhana are doing less livestock keeping due to many problems such as lack of grazing land, breeds, product and by-product management, and economics. Due to such problems, only around half of the community is keeping cattle for milk production and continuing to sell surpluses at local dairies. Farmers say that the milk selling business is no longer profitable. There is concern among farmers that resources may continue to be strained and further exacerbate population challenges, which have limited employment options and resulted in men leaving the area in search of off-farm opportunities in cities.

Map 5. Major changes in resources (comparing past and present) for men



Map 6. Major changes in resources (comparing past and present) for women

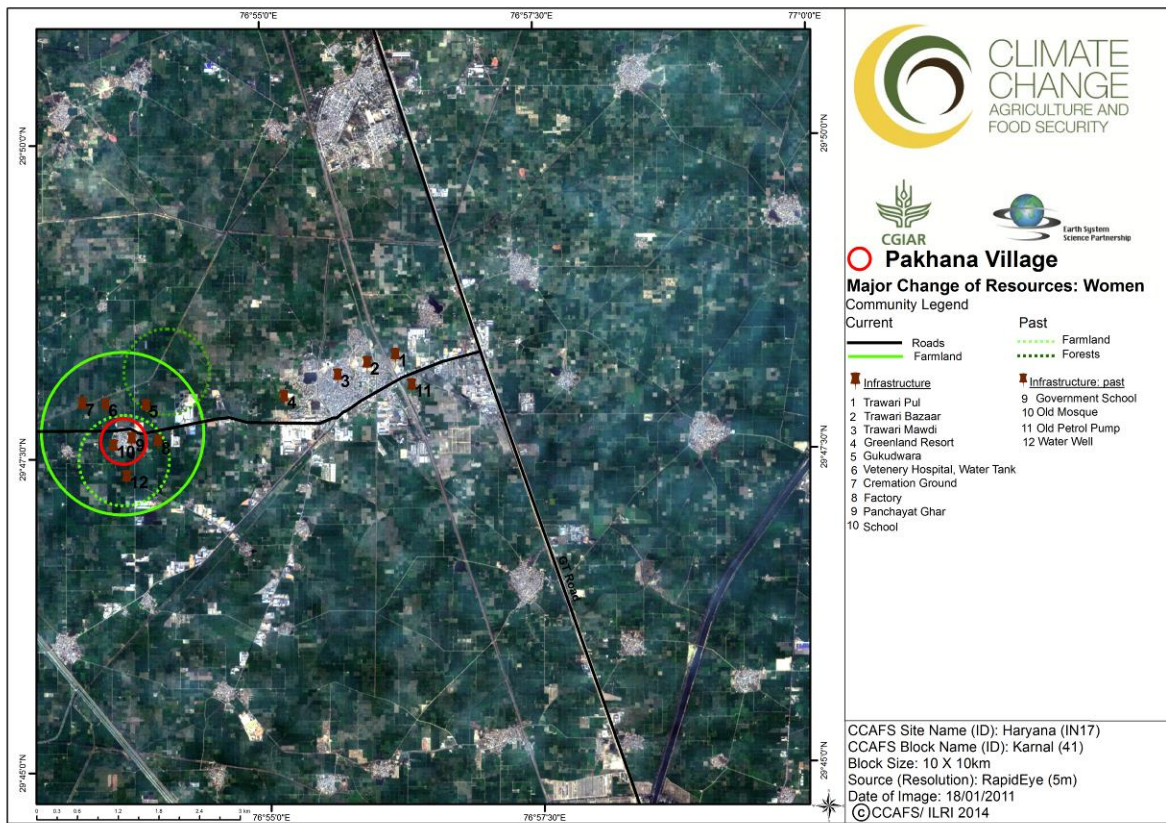


Table 2. Major changes and drivers of change in the last 10 years, as perceived by men (M) and women (F)

| Land cover class | Past state (quality) | Drivers of change | Management and ownership issues | Environmental Benefits |
|--------------------------------|---|--|---|--|
| Forest (F) | There used to be dense forest around the community but it was destroyed and turned into agricultural land | Population growth and expansion of farmlands | Individual | Greenery and oxygen |
| Forest (M) | There used to be a big forest in the area | India and Pakistan partition in 1947 | Government owned forest used for settlement | |
| Grassland (F) | There was some grassland in the area, which was plentiful | Population growth and expansion of farmlands | Individual | Greenery and oxygen |
| Canals (F) | There used to be a local canal named Satlej that provided abundant water | Climate change and population growth | Villagers | Water and good environment |
| Wells and Hand Pump (M) | Major source of drinking water but not used at present | Developed due to increased awareness | Community | |
| Water Resources (M) | Used to be almost perennial | Source of origin drying out | Community | Increase greenery |
| Roads (F) | GT Road used to be dirt | Government | Government | |
| Roads (M) | Used to be dirt and not compacted | Demand from agriculture industry | Government | Access for potential environmental development |
| Mosque (F) | Functional and used by Muslim community who lived in area before 1947 | Forced migration during the India and Pakistan partition | Community | |
| Mosque (M) | There were two mosques before the 1947 partition but now one in ruins | Disuse since partition | | |

D. Vision of the future

With a mixed group of men and women, the goal was to develop an image of village resources and human wellbeing into 2030 to understand the opportunities and constraints, as well as aspirations for the future. This exercise built upon all the work completed in the previous sessions. In addition, the exercise took into account the photographs of the landscape, including things they are proud of and things that need to be improved upon in the future, that a group of young people had produced following instructions given on day 1. In the section below we include the map that encapsulates Pakhana village's vision of the future (Map 7). We also include a few of the photographs taken by the youth. These images operationalize the collective vision of the future.

The group's vision focused on safeguarding production and irrigation capacity as well as expanding income generating and education opportunities. An increase in locally available services such as health clinic, grain storage, swimming pool, library and railway were also desired. In addition, participants cited the need to reduce factory pollution and recycle domestic and agricultural waste to support a cleaner and greener community. Maintaining food security, livelihoods, health and the environment are important to the group's future community vision. The major constraints identified were a lack of support, initiation and funds. Women identified particular constraints to achieve the vision, including low levels of education and literacy, reliance on cow dung for fuel, lack of property ownership and little economic and decision making empowerment. Both men and women had difficulties identifying any organizations that could be involved to support their vision beyond the government and a local integrated pest management (IPM) group.

Map 7. Future map of the community

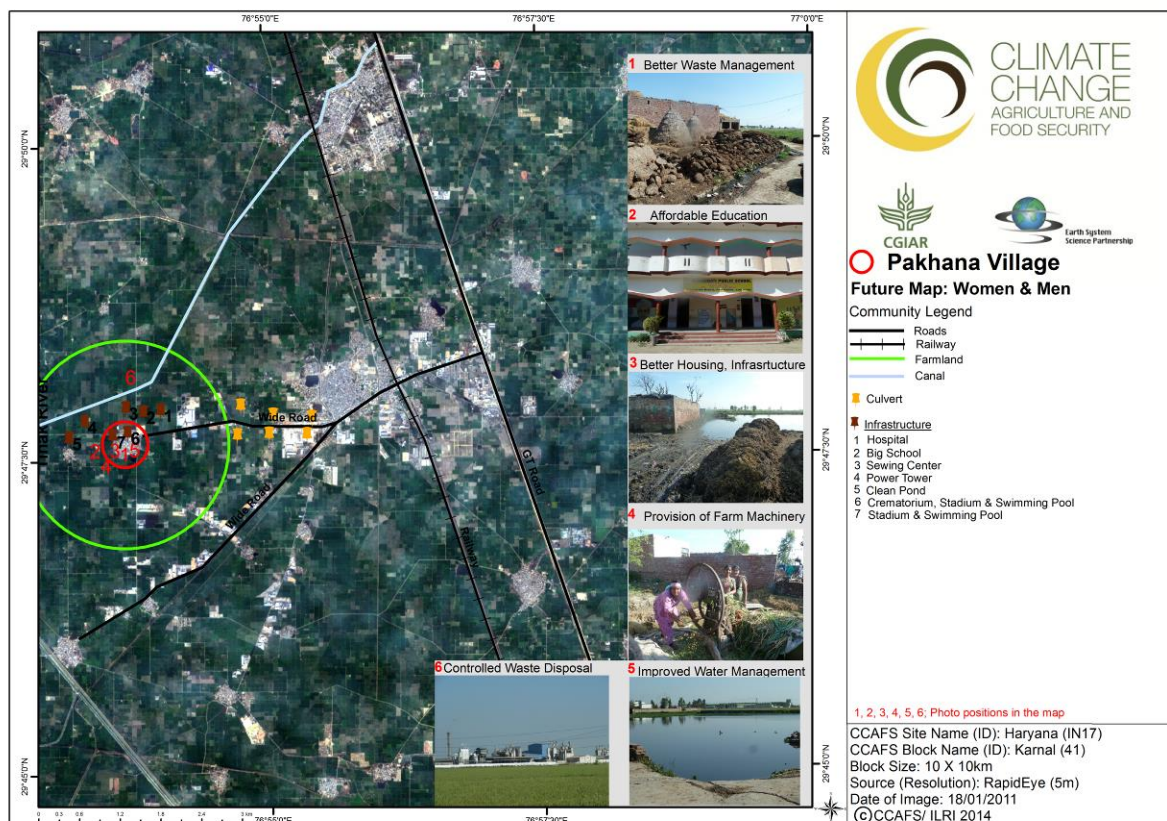


Table 3. Vision of the future

| Resources | Preferred condition for 2030 | Opportunities | Constraints | Organisations to involve |
|--------------------------|---|--|--|---------------------------------|
| Sewing Centre | Sewing centre for women which provides training, located near the Pannchayat Bhawan or school | Very essential entrepreneurial opportunity for women | No initiation from anywhere till date | |
| School | Class up to 12th grade | Women will have access to higher levels of education locally | No initiation from anywhere till date | |
| Hospital | Should be near the school and inside village | Healthcare wont involve far off travel to Tarawardi | No initiation from anywhere till date | |
| Factory | Local factory should be located outside of village to reduce pollution | Pollution free environment will gather more support from the community and climate friendly groups | | |
| Farmland | Should be maintained as it is at present | Soil quality should be improved | Currently heavily using chemical fertilizers and pesticides | IPM Group |
| Stadium | Swimming pool inside the village near the Gurudwara | It would be helpful in keeping people healthy so they can better work on such issues as climate change | | |
| Canal | Water should be available all year round | Increase agricultural production and crop productivity | Government irrigation canal goes through village but community has no access | |
| Roads | Should be bigger and paved | Easier transport of produce from farm gate if road is paved and widened to allow vehicles to pass | No support | |
| Railway | Railway head in the village | Facilitate further export of rice and at lower cost | No support | |
| Drainage | Better drainage management | Orovide cleaner and healthier environment. | Currently dirty | |
| Cremation Grounds | Shades should be built | It will help cremate nearby saving community time | Lack of funds and space | |
| Library | Library inside the Gurudwara | It will help community to broaden their minds by accessing currently available worldwide knowledge and information | Lack of funds | |

Topic 2: Organisational landscapes

This topic aims to show evidence of organisational capacities that help address food security and manage resources. This will inform CCAFS about how prepared the village is to respond to the challenges envisaged as a consequence of climate change or other future challenges and to engage with CCAFS partners at a collective level.

Specifically, this section presents the different formal and informal organisations involved in the community in general terms, as well as with respect to food security in different situations (i.e. average and crisis conditions), and natural resources management (NRM). It also elaborates on what types of activities the organisations are engaged in, who their members are, whether the organisations are useful, etc.

A. Basic spheres of operation

Participants were asked to draw three large concentric circles on the ground. The inner circle would represent the community, the middle circle the locality and the outer circle beyond the locality. Participants were then asked to name organisations working in the area, whose names were written on cards, and place the cards in the appropriate circle. Thus, the group placed in the inner circle the cards of organisations that worked in the community, in the middle circle the cards of organisations operating in the locality, and in the outer circle those that operated beyond the locality. See Photo 2 for an example of the activity as carried out with the study participants. The results are shown in the diagrams that follow.

Based on this structure, the men identified 13 organisations in the village while women identified 8. Three of the identified organizations were the same among men and women. The foci of the organizations operating in and around Pakhana include religion, microfinance, education, health, food distribution, water resources and community development. Most of the identified organizations are operating within the community, however overall men and women reported that not very many organizations are working in and around Pakhana. The men's top ranking organizations were the Primary Agriculture Cooperative Credit Society (PACS), Public Distribution System (PDS), Gram Panchayat and Central Bank. These organizations provide credit and grain access. Gram Panchayat is the lowest level government legal body and is concerned with all developmental activities in the community. The women also ranked Gram Panchayat as one of their top organizations, along with the secondary school and water tank. Women also noted the Gurudwara as an important organization among Sikhs. Generally speaking, however, the women were poorly informed about the organizations operating in their community. In Tables 4 and 5, more detailed information is provided on the five most important organisations as they were ranked by the men's and women's groups.

The performance of identified organizations was found to be poor and weak due to lack of funds and human resources. In the case of the District Agriculture Office and the District Animal Husbandry office, participants clearly stated that they were as good as non-existent. The Gram Panchayat was also said to provide minimal support. In addition, farmers expressed dissatisfaction with rampant corruption in all areas and levels of local organizations. Men reported almost all the institutions are working independently and not coordinating on planning or implementation of activities. Women were not able to identify linkages and claimed there were no linkages between the organizations working in the community and that identified organizations were working separately. The groups nonetheless identified some linkages among organizations. The Gram Panchayat was found to have linkages with Anganwari, PDS, PACS, and government schools with respect to funds. The District Agriculture Office in Karnal also has linkages with the Agriculture Development Office in Tarawadi and the Central Bank to support farmers with technical knowhow. Similarly, the District Animal Husbandry Office in Karnal also supports the Pakhana Livestock Centre.

Photo 2. The organisational landscape activity in progress



Figure 1. Organisational landscape of the men's group

| Legend | |
|--------|--|
| 1 | Primary Agriculture Cooperative Credit Society |
| 2 | Public Distribution System |
| 3 | Gram Panchayat |
| 4 | Central Bank |
| 5 | Secondary School |
| 6 | Agriculture Development Office |
| 7 | Anganwadi |
| 8 | Primary School |
| 9 | Forestry Department |
| 10 | District Agricultural Office |
| 11 | District Animal Husbandry |
| 12 | Agri Produce Market Cooperative |
| 13 | Livestock Centre |

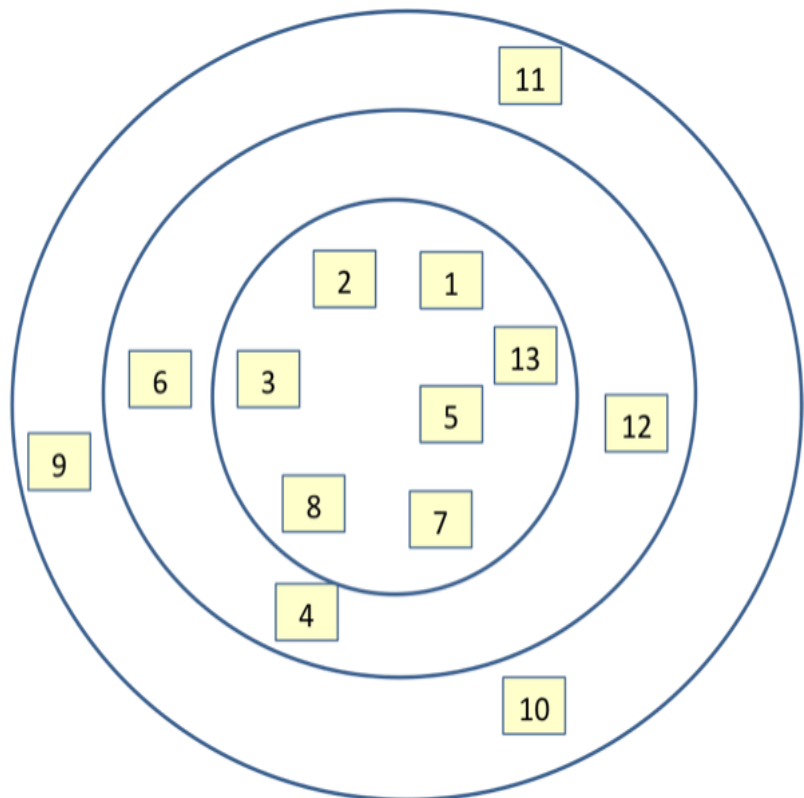


Figure 2. Organisational landscape of the women's group

| Legend | |
|--------|--------------------|
| 1 | Water Tank |
| 2 | Secondary School |
| 3 | Gram Panchayat |
| 4 | Animal Hospital |
| 5 | Anganwadi |
| 6 | Asha for Education |
| 7 | Government |
| 8 | Gurudwara |

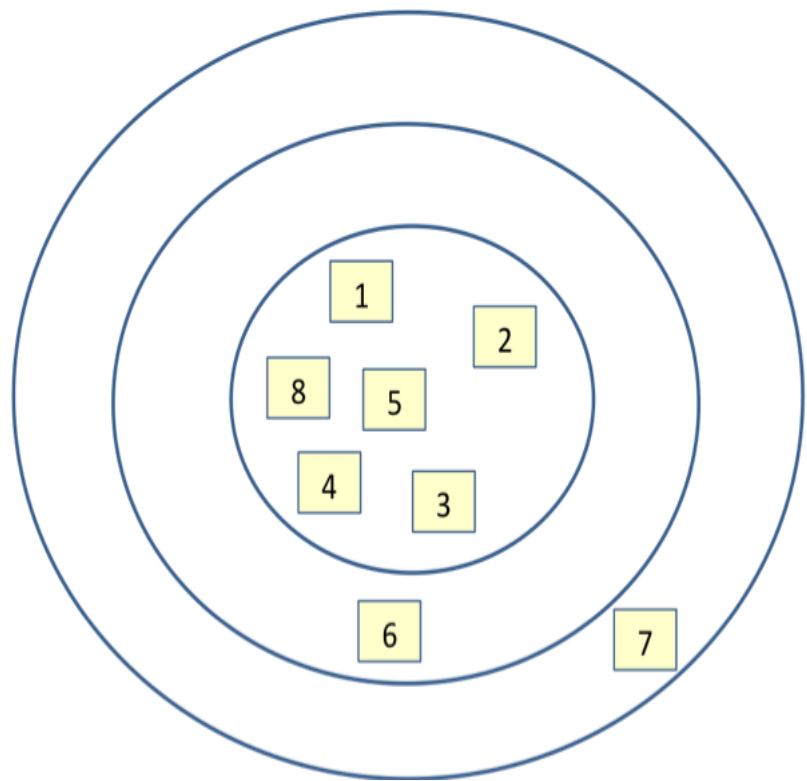


Table 4. Information on the first five organisations ranked by the men

| Organisation name | Main activities | Number of members (estimate) | Access (open or restricted to...) | Origin (indigenous, state, NGO, project) | Sphere of operation: community, local, beyond local | For community groups | | |
|--|---|------------------------------|-----------------------------------|--|---|--|--|--------------------|
| | | | | | | Sources of funding (members, external, both) | Existed how long (less than 1 yr, 1-5, longer) | Formal or informal |
| 1 Primary Agriculture Cooperative Credit Society | Provides credit to the community and more than 14 villages in the surrounding area | 10 Staff | Open | State | Community | External | Longer – since 1960s | Formal |
| 2 Public Distribution System (PDS) | Provides food grains to the community | | Open | State | Community | External | Longer – over 40 years | Formal |
| 3 Gram Panchayat | Development activities in the village, community administrative work and community politics | 4 Staff | Open | State | Community | External | Longer – over 40 years | Formal |
| 4 Central Bank | Provides loans to the community | 6 Staff | Open | State | Local | External | Longer – over 40 years | Formal |
| 5 Secondary School | Education of children | 15 Teachers | Open | State | Community | External | | Formal |

Table 5. Information on the first five organisations ranked by the women

| Organisation name | Main activities | Number of members (estimate) | Access (open or restricted to...) | Origin (indigenous, state, NGO, project) | Sphere of operation: community, local, beyond local | Sources of funding (members, external, both) | Existed how long (less than 1 yr, 1-5, longer) | Formal or informal |
|--------------------------|---|-------------------------------------|--|---|--|---|---|---------------------------|
| 1 Water Tank | Provides clean drinking water to the community | 2 Staff | Open | State | Community | External | Longer – since 30 - 40 years | Formal |
| 2 Secondary School | Education up to class eight; mid day meal to the students of the village; some money to buy dress and education materials | 13 Teachers | Open | State | Community | External | Longer – since 20 – 25 years | Formal |
| 3 Gram Panchayat | Solves problems of community people; builds roads and infrastructural development | 12 (1 staff and 11 from community) | Open | State | Community | External | Longer – since 40 – 50 years | Formal |
| 4 Animal Hospital | Vaccination and treatment of livestock of community members | 2 Doctors | Open | State | Community | External | Longer – since 15 – 20 years | Formal |
| 5 Anganwadi | Education for small children; provides meals; vaccination for kids and pregnant women | 1 Teacher | Open | State | Community | External | Less than 1 year | Formal |

B. Organisational landscape of food security

The goal of this exercise was to get an improved understanding of how the organisational landscape contributes to the food security of the group. Food security is mostly measured at the household level. Nonetheless, community-level organisations and interactions influence the food security of different groups within the community differently. Male and female participants were asked to discuss the concepts of food availability, access and utilization, and then review each organisation they had previously identified by asking which of them had activities that fell under these categories. Organizations identified by men and women are shown in Figures 3 and 4.

The men identified 12 organizations working in food security while the women identified 5. Women were less aware with organizations working in the community and unsure of names for those that were familiar. The men reported there were no permanent institutions working solely in the area of food security within the village and some organizations addressed such needs in addition to other mandates. No organizations were reported focusing on food crises, as the community has not faced such a crisis since the 1950s. Some weaker population sections from the food security point of view are receiving monthly rations of rice and wheat from the government’s PDS. The women reported that the schools and Anganwadi also provide free food to children and pregnant women. Overall, Pakhana is food secure and 90% of households meet their food requirement entirely through their own farms. Women noted one possible area of food insecurity could be tied more broadly to the labour markets and the need for some to purchase food. Many female participants were landless and working as wage labour on other people’s farms so they are dependent on their wages and rely on markets for food. The majority of food security related organizations identified by men and women are focused on food availability and to a lesser extent food access and utilization. Access to credit is also a major focus, with funds coming from PACS and the Central Bank. More than 80% of the community has received PACS agriculture loans given their more reasonable interest rates. The Central Bank is also popular given higher loan limits of 300-500 Rupees. In addition, the government long ago established a Pakhana Agricultural Office to provide technical support to area farmers. Participants noted the office generates and provides technology but does not do much more. As with most of the identified organizations, a lack of funds and capacity was reported among those targeting food security.

Figure 3. Organisational lanscape of food security – men

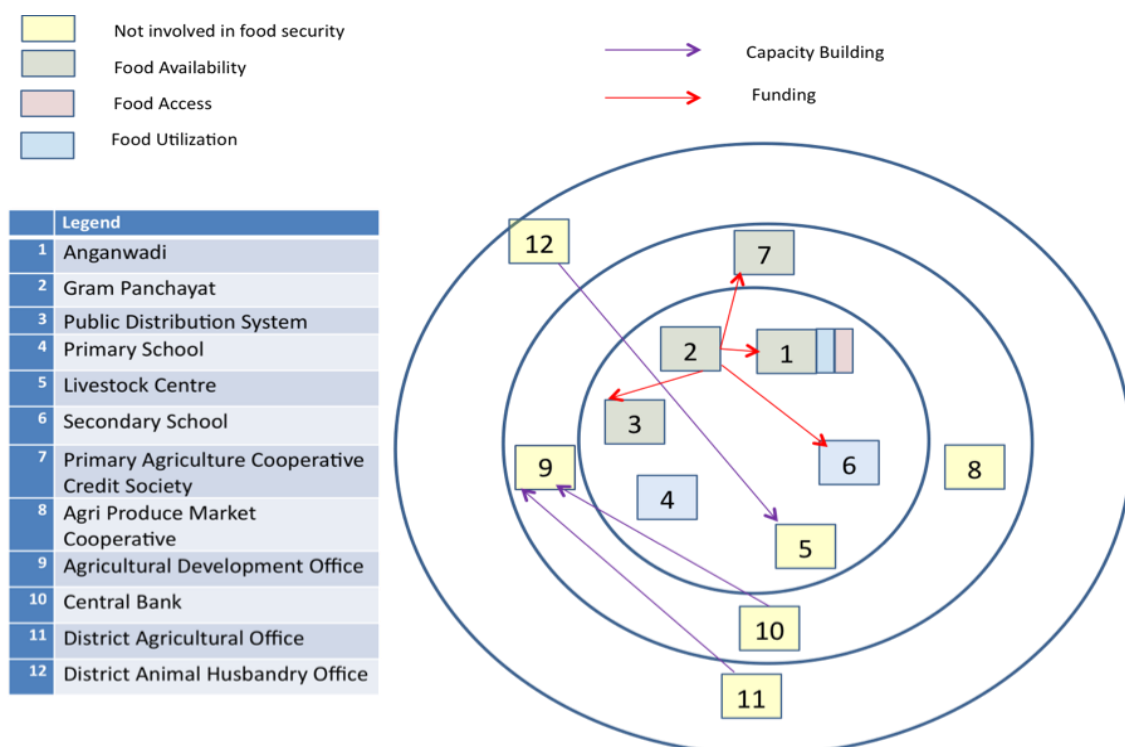
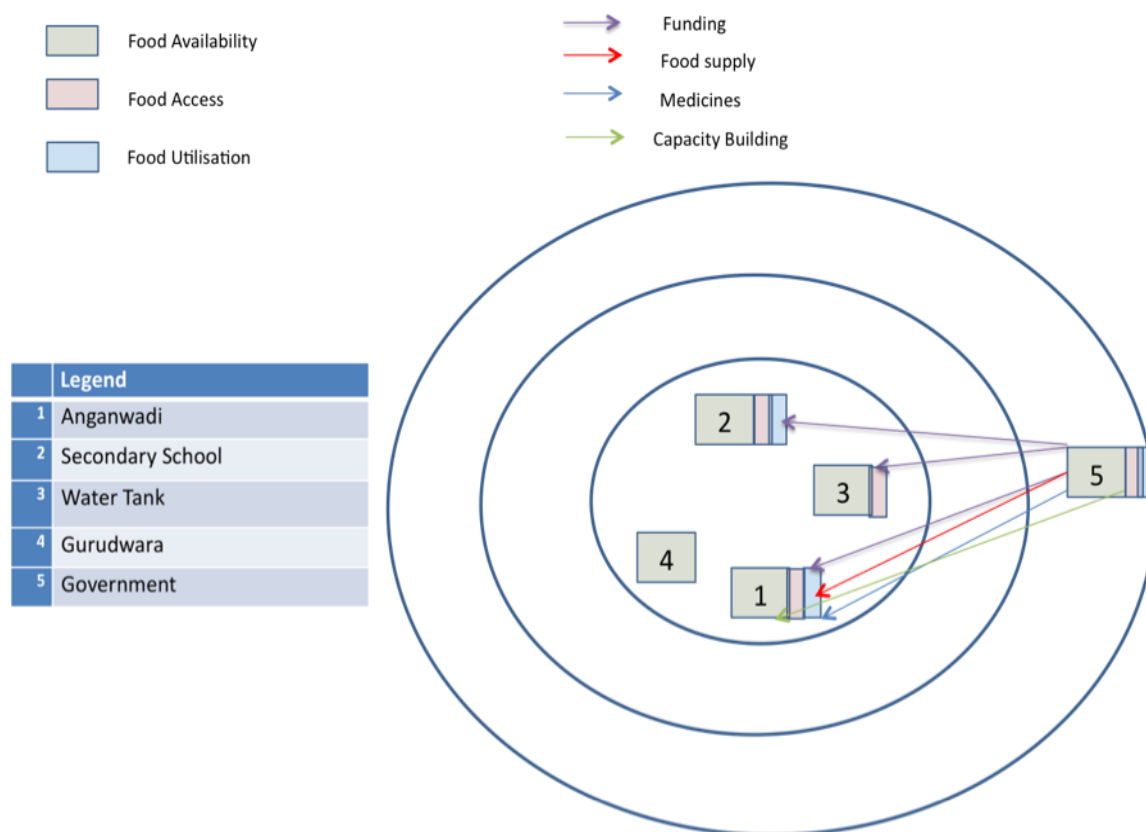


Figure 4. Organisational landscape of food security – women



C. Organisational landscape of natural resource management

In this section, the organisational landscape in relation to NRM is discussed. Specifically, what organisations were actively working to protect the environment, manage natural resources, etc.? The process entailed asking the group to highlight what organisations are involved in the management of natural resources in the community; developing a list of natural resources important to the livelihoods of the community; and asking the group to decide on a symbol for each type of natural resource listed.

The men’s group identified 6 organizations working in NRM related areas. They noted those addressing NRM issues were few and very weak institutionally due to lack of funds and human resources. The women’s group was less familiar with NRM and not aware of any organizations supporting these efforts in Pakhana aside from the government. One of the biggest gaps found among identified organizations was that there were no organizations working specifically in NRM or climate change as such other than those working in livestock and agriculture. A lack of climate change support was challenging given participants clearly explained climate change impacts on their farms and livelihoods. Male participants focused on NRM support in relation to their farms and said that they were not receiving adequate management support. They also lamented that chemical inputs available in Pakhana were often fake and did not work. Women also mentioned NRM related support from the government was rumoured to come from some villagers petitioning for fertilizer subsidies. NRM linkages were found between the Pakhana Gram Panchayat and the District Agricultural Office in Karnal, the Agriculture Office in Tarawadi, the Forest Department in Karnal and the District Animal Husbandry Office in Karnal. All these organizations were supporting the Gram Panchayat with technologies and manpower. The District Animal Husbandry Office in Karnal also supported the Livestock Centre in Pakhana directly.

Figure 7. Organisational landscape of natural resource management – men

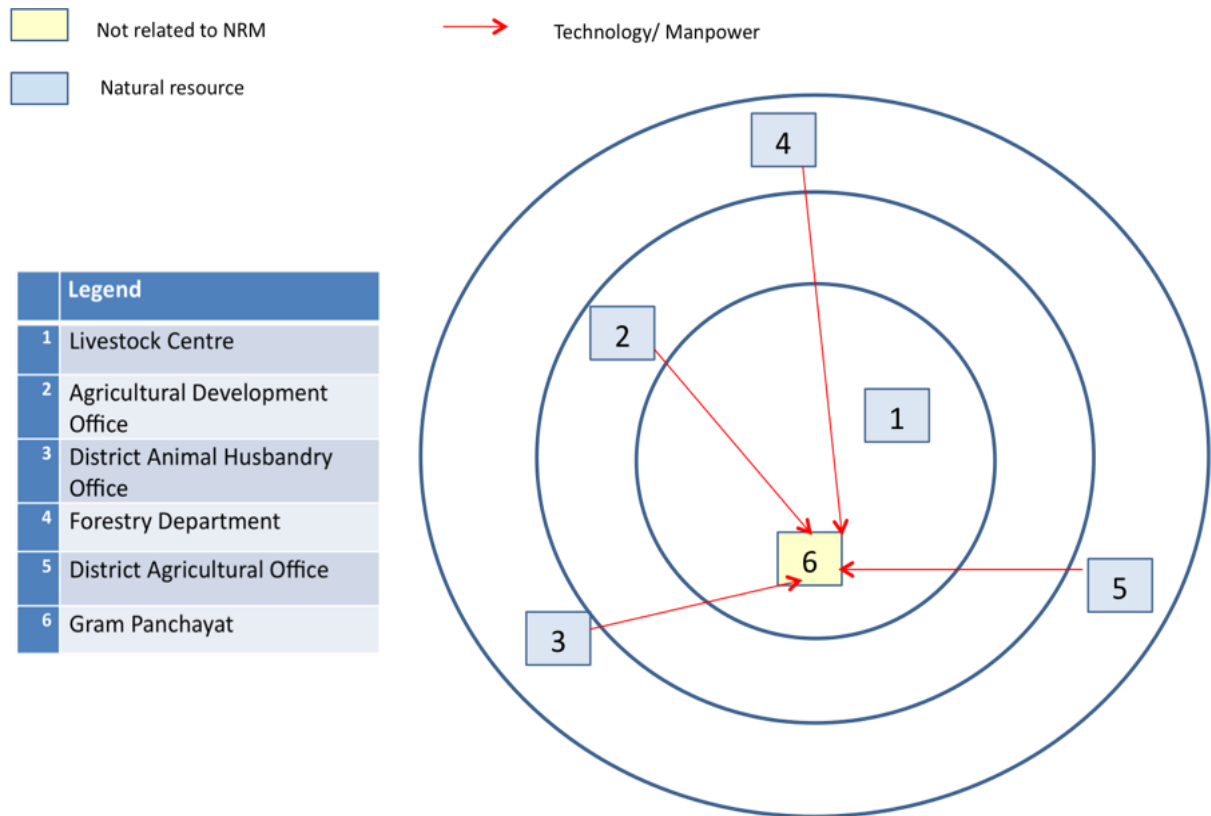


Figure 8. Organisational landscape of natural resource management – women

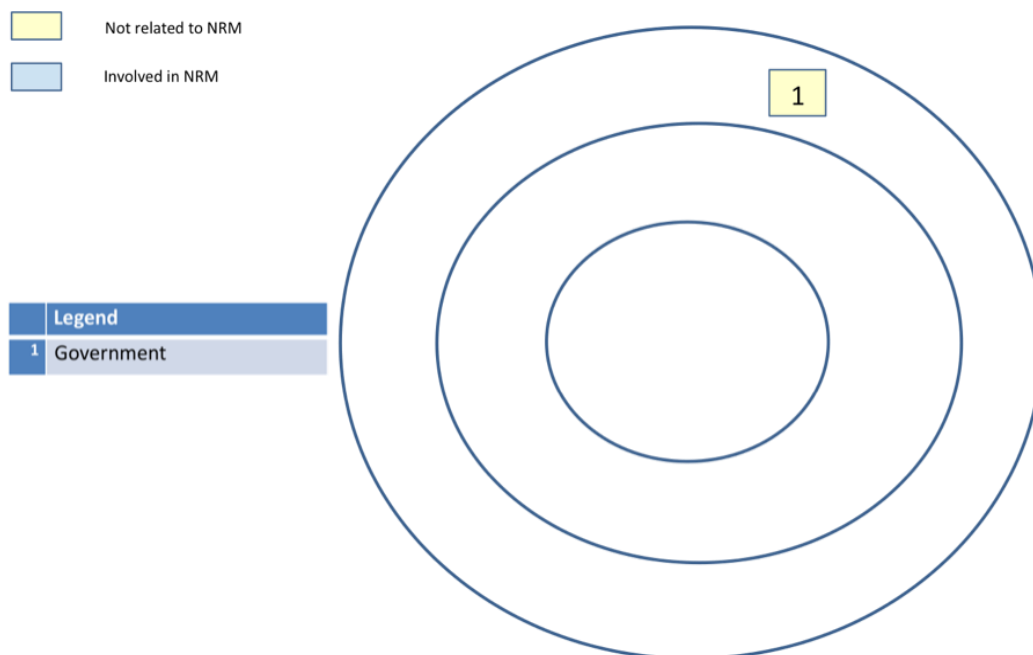


Table 6 summarizes information on all the organisations identified separately by male and female participants. The organisations are classified according to their role in supporting food availability, access and/or utilization, as well as the provision of relief in times of food crisis, and NRM.

Table 6. Information on highlighted organisations of men and women (1=yes, 0=no)

| Organisational Landscape Name of organisation | Men | | | | | Women | | | | |
|--|-------------------|---|------------------|----------------|----------|------------------------|---|------------------|----------------|----------|
| | Org. ID by men | Sphere 1=Village 2=Locality 3=Beyond locality | Food security | Food crisis | NRM | Org. ID by women | Sphere 1=Village 2=Locality 3=Beyond locality | Food security | Food crisis | NRM |
| 1. Primary Agricultural Cooperative Credit Society | 1 | 1 | 1 | 0 | 0 | | | | | |
| 2. Public Distribution System | 1 | 1 | 1 | 0 | 0 | | | | | |
| 3. Gram Panchayat | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 0 | 0 |
| 4. Central Bank | 1 | 2 | 1 | 0 | 0 | | | | | |
| 5. Secondary School | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 6. Agriculture Development Office | 1 | 2 | 1 | 0 | 1 | | | | | |
| 7. Anganwadi | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 0 |
| 8. Primary School | 1 | 1 | 1 | 0 | 0 | | | | | |
| 9. Forestry Department | 1 | 3 | | 0 | 1 | | | | | |
| 10. District Agricultural Office | 1 | 3 | 1 | 0 | 1 | | | | | |
| 11. District Animal Husbandry Office | 1 | 3 | 1 | 0 | 1 | | | | | |
| 12. Livestock Centre | 1 | 1 | 1 | 0 | 1 | | | | | |
| 13. Agri Produce Market Cooperative | 1 | 2 | 1 | 0 | | | | | | |
| 14. Water Tank | | | | | | 1 | 1 | 1 | 0 | 0 |
| 15. Animal Hospital | | | | | | 1 | 1 | 0 | 0 | 0 |
| 16. Asha for Education | | | | | | 1 | 2 | 0 | 0 | 0 |
| 17. Gurudwara | | | | | | 1 | 1 | 1 | 0 | 0 |
| 18. Government | | | | | | 1 | 3 | 1 | 0 | 1 |
| TOTALS | 13 | Village=7 Locality=3 Beyond locality=3 | 12 | 0 | 6 | 8 | Village=6 Locality=1 Beyond locality=1 | 5 | 0 | 1 |

Topic 3: Information networks

The aim of this exercise was to understand the diversity of options people use for accessing information on agriculture and weather; how people take advantage of sources of information available, and if some sources are not used and why. We want to describe networks of how people access and share information within the community.

Men and women identified 19 sources of information. Men reported their main interests were farming, weather, prices, plant protection and climate change. Women were more interested in weather, farming, livestock, and health and nutrition related information. Farming was the most sought after type of information by men, followed by climate change and equally weather and prices. Women reported accessing the same quantities of all types of information. Among sought after weather information, rain forecasts were the most common, whereas inquiries on extreme weather were uncommon. Access to information is facilitated through Pakhana's existing facilities such as phones, mobiles, electricity, television, radio and transport. Among men and women the most popular sources of information were friends, relatives, neighbours, radio and television. While other sources are available, including free mobile phone access to price information, participants used them less frequently. Television programs such as Agri World were popular in providing men and women access to agricultural information. Women noted their limited market access and poor literacy were limiting factors that restricted their access to information. Given these limitations, women reported obtaining most of their information from agricultural and livestock product suppliers, discussing with those who have travelled outside Pakhana, and engaging with teachers, parents and neighbours.

Table 7. Sources of information for men and women (1=yes, 0=no)

| Source | Topic (women) | | | | Topic (men) | | | | Total |
|----------------------|---------------|-------------|-----------|----------------------|-------------|------------------------|-------------|----------------|-------|
| | Weather | Agriculture | Livestock | Health and Nutrition | Weather | Agricultural Marketing | Agriculture | Climate Change | |
| Individuals | | | | | | | | | |
| Friends/relatives | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Neighbour | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Middleman | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Organizations | | | | | | | | | |
| Agro Metro Dept. | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 |
| IFFCO Sanchar | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 3 |
| PACS | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 3 |
| Gov't Call Centre | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 2 |
| Agro Dept. | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 2 |
| ICAR | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Media | | | | | | | | | |
| Radio/TV | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 8 |
| Newspaper | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | 4 |
| Other | | | | | | | | | |
| Observation | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 4 |
| Agro-Vet | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Trainings | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Market | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 3 |
| Grain Market | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Agro Fairs | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Input Traders | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Agro Campaigns | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 2 |
| Total | 6 | 6 | 6 | 6 | 7 | 7 | 10 | 8 | |

Conclusion and recommendations

Pakhana is located in the Karnal district of Haryana state and situated in the fertile flat land of India's Indo-Gangetic plains. The village has access to roads, markets, electricity and communication. The majority of Pakhana is food secure with smaller portions of the population receiving food subsidies from the government. Most people are farming their own land or working as labourers on other people's land. There are some opportunities for off-farm employment in the agribusinesses located in the community. Pakhana is located in one of two major rice producing states in India. Wheat is another major crop and people are also involved in dairy and vegetable production to a lesser extent. Farmers benefited from the Green Revolution and have achieved food security through adoption of improved seeds, fertilizers and pesticides.

The village, however, now faces a precarious situation where their production and livelihood achievements are at risk given the impacts of population growth, climate change and natural resource depletion. Following the partition of India and Pakistan, Pakhana's population expanded as Sikhs moved into the area, resulting in deforestation to meet the increased demand for farmland. The lack of forests, combined with prolonged use of fertilizers, monocropping, decreasing soil organic matter, and use of cow dung for fuel, is starting to negatively impact soil fertility. The population used to enjoy plentiful access to water for irrigation and drinking, however canals are now mostly dry and rainwater has become variable and less abundant. Farmers now rely on wells, which is reducing the water table and straining resources as demand outpaces supply and rainwater is insufficient to restock aquifers. As a result of these factors farming and dairy production is becoming more difficult and less profitable. The community vision for the future is sustainable food production and livelihoods. Participants also noted that to achieve their vision education, health and wellness services will need to be upgraded to ensure expanded opportunities and potential for men, women and youth.

There are several organizations working in and around Pakhana, of which the men's group identified 13 and women 8. These organizations focus on microfinance, education, health, food distribution, water resources and community development. Several entities engage with the community, including religious, non-governmental, financial, local and district level government offices, and national programs. The majority of food security related organizations identified are focused on food availability and to a lesser extent food access and utilization. There are lower levels of support for production and market related activities, with the majority of support focusing on direct feeding of vulnerable populations and access to credit. NRM related organizations were few and those in operation had limited NRM engagement and were focused on agriculture or livestock. Study participants lamented a lack of NRM as well as climate change related support, particularly given their challenges with soil and water resources in addition to experiencing changing climatic conditions. All organizations identified were found to be weak and did not meet community needs. Men and women also reported organizational problems due to rampant corruption and a lack of organizational funds and human resources.

Men and women identified numerous sources for information on production, markets, weather, health and nutrition, livestock, and climate change. A total of 19 sources were reported, however the most popular were friends, relatives, neighbours, radio and television. Other sources were available, including free mobile phone access to price information, however participants used them less frequently. Access to information was not cited as a major constraint given Pakhana's existing facilities such as phones, mobiles, electricity, television, radio and transport. However, women noted their inability to travel to markets and poor literacy made them more focused on direct, local sources of information. Farming was the most sought after type of information by men, followed by climate change and equally weather and prices. Women reported accessing the same quantities of all types of information. Among sought after weather information, rain forecasts were the most common, whereas inquiries on extreme weather were uncommon.

Implications for CCAFS

Future CCAFS work and that of other organizations will need to address soil fertility, water availability and access, profitability constraints, and climate change to maintain food security, livelihoods and natural resources in Pakhana.

The Karnal site is agriculturally developed and farmers are progressive and hard working, which offers opportunities for meaningful action by the community, CCAFS and partners to address its challenges. Climate change awareness exists among men and women, however research and education are needed to better understand dynamics and mitigate impacts. The population is in immediate need of adaptation measures to address declining soil fertility, water availability, production costs, and rice, wheat and vegetable productivity. To improve and sustain crop performance, diversification, organic production, improved technology, reduced dependence on chemical inputs, and soil conservation can be promoted. While rice and wheat are important crops in the region, an expansion of vegetable and fruit production will benefit community health and livelihoods. There is high potential to improve soil fertility by interventions such as green and farmyard manure, composting, use of biogas, and roadside tree planting. Declining access to drinking and irrigation water is a significant issue that needs to be addressed. The irrigation canals can be repaired, access to the government canal negotiated, drainage managed, and rainwater harvesting increased. Ultimately, population and production pressures on groundwater depletion need to be studied and addressed to ensure the long-term viability of water access in Pakhana. In addition, to ensure food security and livelihoods opportunities for men, women and youth, activities such as value addition, enterprise development, dairy cow production, local off-farm employment, and increased access to education can be supported. There is a clear need to establish a support structure at the village level with long, medium and short-term goals. This has to be tied up with the Gram Panchayat of Pakhana. Organizational capacity, corruption, and lack of resources need to be addressed among all entities operating in and around Pakhana. With improved access to assistance and capacity building, Pakhana is well positioned to effectively address its evolving conditions.

Among the organizations noted by the groups, those presented in Table 8 are of particular interest for CCAFS. Given the implications for CCAFS and the identified challenges for Pakhana, Table 9 provides a summary of targeted recommendations based on opportunities.

Table 8. Potential CCAFS partners

| ORGANISATION | SPHERE OF OPERATION | ACTIVITIES | STRENGTH |
|------------------------|---------------------|--------------------------------------|--|
| Gram Panchayat | Village | Governance and community development | Legal body that takes care of community needs and coordinates activities |
| Agriculture Department | Locality | Agriculture | Technology provision |
| Livestock Department | Locality | Livestock | Livestock |
| IFFCO Tokyo | Beyond Locality | Insurance | Weather index-based insurance |

Recommendations for major opportunities

Table 9. Recommendations for major opportunities

| Gaps in knowledge/ current constraints that could provide opportunities/niches for CCAFS and partners | Opportunities for research (CCAFS) | Opportunities for Action Research (CCAFS partners) | Development Interventions (Partners) |
|---|------------------------------------|--|--------------------------------------|
| 1. Research on water harvesting and on charging ground water system | X | | X |
| 2. Support technology transfer | X | | |

| Gaps in knowledge/ current constraints that could provide opportunities/niches for CCAFS and partners | Opportunities for research (CCAFS) | Opportunities for Action Research (CCAFS partners) | Development Interventions (Partners) |
|---|---|---|---|
| 3. Research on climate change issues | X | | |
| 4. Collection and modelling of weather and carbon sequestration information | X | | |
| 5. Initiate and prioritize locally adaptable new technologies while validating others currently available | X | | |
| 6. Possible prioritization of research activities on adaptation issue related to cereals | X | X | |
| 7. Support climate friendly agricultural practices such as organic production and low energy farming methods like zero and minimum tillage | X | X | X |
| 8. Support research through local trials and validation | | X | |
| 9. Learn lessons from the high use of inputs and their impacts to reduce applications and support new farming management practices | | X | |
| 10. Design a long term research plan for partners to work together with CCAFS | X | X | |
| 11. Support shift in focus to green agriculture practices such as organic farming, integrated pest management, and farmer field schools and plant clinics | | X | X |
| 12. Focus on research, development and training activities to advance usage of bio fertilizers and pesticides | | X | X |
| 13. Support agriculture and natural resource management | | X | |
| 14. Improve livestock keeping system | | X | X |
| 15. Improve soil management through composting and green and farmyard manure | | X | X |
| 16. Improve farm level agriculture technologies | | X | |
| 17. Upgrade and equip existing health clinics | | X | |
| 18. Upgrade and repair drainage facilities | | X | |
| 19. Support agro-processing and value addition | | X | |
| 20. Support agricultural marketing | | X | |
| 21. Expand tree and orchard plantations | | X | X |
| 22. Facilitate farmer capacity development through exposure visits and tours | | | X |