

# Developing generic tools for characterizing agricultural systems for climate and global change studies (IMPACTlite – phase 2)

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Mariana C. Rufino<sup>1</sup>, Carlos Quiros<sup>1</sup>, Moussa Boureima<sup>2</sup>, Solomon Desta<sup>3</sup>, Sabine Douchamps<sup>4,1</sup>, Mario Herrero<sup>1</sup>, Jusper Kiplimo<sup>1</sup>, Dikite Lamissa<sup>5</sup>, Joash Mango<sup>6</sup>, Abdoulaye S. Moussa<sup>7</sup>, Jesse Naab<sup>8</sup>, Yacine Ndour<sup>9</sup>, George Sayula<sup>10</sup>, Silvia Silvestri<sup>1</sup>, Dhiraj Singh<sup>11</sup>, Nils Teufel<sup>11</sup>, Ibrahim Wanyama<sup>12</sup>

<sup>1</sup>International Livestock Research Institute (ILRI), Nairobi, Kenya

<sup>2</sup>Institut National de la Recherche Agronomique du Niger (INRAN), Niamey, Niger

<sup>3</sup>Managing risk for improved livelihood (MARIL), Addis Ababa, Ethiopia

<sup>4</sup>International Water Management Institute (IWMI), Ouagadougou, Burkina Faso

<sup>5</sup>Institut d'Economie Rurale (IER), Bamako, Mali

<sup>6</sup>World Agroforestry Centre (ICRAF), Kisumu, Kenya

<sup>7</sup>Program on Climate Change, Agriculture and Food Security (CCAFS), Bamako, Mali

<sup>8</sup>Savanna Agricultural Research Institute, Wa, Upper West Region, Ghana

<sup>9</sup>Institut Sénégalais de Recherches Agricoles, Dakar, Senegal

<sup>10</sup>Selian Agricultural Research Institute (SARI), Arusha, Tanzania

<sup>11</sup>International Livestock Research Institute, New Delhi, India

<sup>12</sup>International Institute for Tropical Agriculture (IITA), Kampala, Uganda

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## **1 Introduction**

Standard methods are needed to collect data to evaluate the performance of agricultural systems. Standardization allows comparisons across systems, and potentially the extrapolation of recommendations to similar development domains. The Integrated Modelling Platform for Mixed Animal Crop Systems (IMPACT, Herrero et al., 2007) is a data collection protocol and computer software tool designed to gather minimum datasets in smallholder crop-livestock systems. The protocol collects information ranging from household composition to crop and livestock production to household food consumption and household assets. Although IMPACT's datasets are detailed to conduct a wide range of crop-livestock systems analysis, the data collection on the field proved to be time and resources demanding. The protocol works in monthly time steps i.e., most of the data is collected per month, thus it takes considerable time to complete an interview. The printed forms comprise over 30 different templates that resemble the screens in the software, and although this could speed up data entry, its use on the field for data collection often tends to be inoperative.

In 2011 CCAFS commissioned to ILRI the task of assessing the possibilities for simplifying IMPACT to carry out a characterization across the 15 CCAFS benchmark sites (Table 1). The objective of this project called 'IMPACTlite' was to modify IMPACT to be able to collect household-level data detailed enough to capture within-site variability on key performance and livelihood indicators that could be used for a range of analysis including the modelling of impact of adaptation and mitigation strategies on livelihoods, food security and the environment. A team composed of agronomists, economists, computer, environmental, and social scientists modified and tested the new tool in a number of sites. The changes implemented to the tool are reported in Quiros et al. (2011). In this report we describe the steps undertaken in the implementation of the surveys using IMPACTlite in the IGPs, the progress achieved, and next steps planned for 2013.

## **2 Methods**

The surveys were implemented across the 15 CCFAS sites (Table 1) starting from February until December 2012. The details of the procedures for the implementation can be found in the IMPACTlite Training Manual (Rufino et al. 2012). In brief, the steps were: 1) Gathering secondary data for each research grid, 2) Definition of agricultural production systems, 3) Villages selection, 4) Generating village information: creating a list of households, 5) Selecting households from a village list, 6) Replacing selected households, and 7) Implementing the survey. The IMPACTlite team at ILRI gathered secondary information for each of the research grids, with assistance from the CCAFS Science officers. Most of this information was gathered during the implementation of the Household Baseline surveys.

We enclose to this report the training manual of IMPACTlite and a sample questionnaire used in Vaishali, India.

Table 1: CCAFS baseline sites and sampling frames description

Country	Site	Site ID	Research grid	Research grid coordinates
Kenya	Nyando	KE01	Katuko Odeyo	(35.068, 0.269)(35.068, 0.361) (34.979, 0.361)(34.979, 0.269)
Kenya	Makueni	KE02	Katheka-Kai	(37.326, -1.581)(37.378, -1.657) (37.298, -1.702)(37.244, -1.624)
Uganda	Albertine Rift	UG01	Hoima	(31.546, 1.445)(31.546, 1.535) (31.457, 1.535)(31.457, 1.445)
Uganda	Kagera Basin	UG02	Rakai	(31.394, -0.921)(31.481, -0.621) (31.484, -0.713)(31.394, -0.713)
Tanzania	Usambara	TZ01	Lushoto	(38.714, -4.850)(38.301, -4.850) (38.301, -4.790)(38.417, -4.790)
Ethiopia	Borana	ET01	Yabare	(38.278, 4.975)(38.549, 4.975) (38.549, 4.704)(38.278, 4.704)
Burkina Faso	Yatenga	BF01	Tougou	(13.554, -2.113)(13.554, -2.391) (13.828, -2.391)(13.828, -2.391)
Ghana	Lawra-Jirapa	GH01	Lawra	(10.455, -2.624)(10.455, -2.911) (10.735, -2.624)(10.735, -2.911)
Mali	Segou	MA01	Cinzana	(13.228, -5.613)(13.228, -5.912) (13.509, -5.911)(13.509, -5.613)
Niger	Kollo	NI01	Fakara	(13.379, 2.826)(13.654, 2.826) (13.654, 2.547)(13.379, 2.547)
Senegal	Kaffrine	SE01	Kaffrine	(13.968, -15.407)(14.242, -15.407) (14.242, -15.686)(13.968, -15.686)
India	Bihar	INXX	Vaishali	(25.803, 85.296)(25.803, 85.392) (25.713, 85.296)(25.713, 85.392)
India	Haryana	IN15	Karnal	(29.842, 76.888)(29.842, 76.993) (29.750, 76.888)(29.750, 76.993) <sup>1</sup>
Bangladesh	Khulna	BA03	Bagerhat	(22.552, 89.812)(22.552, 89.912) (22.461, 89.812)(22.461, 89.912)
Nepal	Rupandehi	NE03	Rupandehi	(83.401, 27.500)(83.500, 27.500) (83.401, 27.589)(83.401, 27.589) <sup>2</sup>

<sup>1</sup> Two squares were excluded as urban:

(29.8090, 76.9190)(29.8090, 76.9380) (29.7920, 76.9190)(29.7920, 76.9380) and  
(29.8424, 76.9229)(29.8424, 76.9414) (29.8286, 76.9229)(29.8286, 76.9414)

<sup>2</sup> One square was excluded as urban: (27.5270, 83.4372)(27.5270, 83.4712) (27.5000, 83.4372)(27.5000, 83.4372)

## 2.1 Village lists and village census in the Indo-Gangetic plains (IGP)

The first step in preparing the household survey in the four research grids was to establish a list of all villages within these grids and to collect some basic village-level information. Unfortunately, secondary data was not available in sufficient detail or quality. Also, the previous base-line survey did not provide village lists with geographic identification. Therefore, a member of the survey team set out initially to compile a list of all villages, record gps co-ordinates and fill short (1-page) questionnaire form on village characteristics: Village identification, population size, land and irrigation resources, ranking of livestock and cropping activities by importance to village. For this a

motor-bike was hired and the grid area thoroughly combed. During this exploratory phase initial results were passed back to the office and village locations were compared to Google Earth images. Visible settlements missing in the initial lists were discussed and added where appropriate.

An important issue at this stage was the definition of "village". In India, the oldest and bottom-level administrative unit is the "revenue village". As the name implies this has been established for tax reasons and is therefore more linked to land than to population. Therefore, some revenue villages don't contain any settlements while others contain several which don't form any social unit. In addition, settlement patterns differ greatly throughout the Indo-Gangetic Plains. While in areas with relatively late colonization, as in Haryana and Punjab, villages are comparatively large and well defined, other areas which had had high population densities for centuries, as in Bihar, settlement patterns are much more dispersed. Thus, we developed an own approach to defining a settlement as a village: Wherever a settlement has an own distinctive name it is regarded as a village. However, if a settlement is only regarded as part of a larger village without an own name it is regarded as a hamlet (tola). Often such hamlets are home to a certain community and are known only by the community name. In Nepal, local administrative units have been consistently organized into village development councils (VDC). Each VDC consists of 9 wards, representing small hamlets. For sample selection purposes within this study, a VDC is a useful unit. It is small enough to enable its inhabitants to know of one another and function as a social unit. In Bangladesh settlement patterns resembled the Bihar situation and we applied the same procedure by defining "villages" according to naming practices. It took about two weeks to establish a complete village list with the accompanying basic data at each research site. Google Earth images of all four research grids with village locations are included in the annex (section 8).

### **3 Identification of production systems and village selection**

#### **3.1 Indo-Gangetic plains (IGP)**

The identification of production systems within research grids is based on the village census data (see 2.1). Respondents (one group per village) were asked to rank crops (including aquaculture) by their importance for the three main cropping seasons as well as livestock (no seasonal differentiation). Here, only count values (number of villages reporting specific rank or rank aggregate) are reported. These results were used to decide on whether to define one or several clearly demarcated production systems within the respective grids. In case of two or more production systems, villages are classified according to production systems and households are sampled separately within each production system class. This ensures a statistically useful sample of households for each production system.

##### *Dominant land use*

The first indication of dominant crop production system (including aquaculture) is whether a specific crop (or crop combination) is mentioned as rank1 in more than one season. Here, paddy-wheat is defined as assigning rank1 to paddy in kharif (rainy season) or summer and to wheat in *rabi* (winter). All other specific land-uses are defined as dominant when showing rank1 in more

than one season. Villages where none of the four specific cropping systems dominate are classified as mixed-cropping.

Table 2: Dominant land use system in the IGPs

[village counts]	Vaishali	Rupandehi	Karnal	Bagerhat
Paddy-wheat	<b>71</b>	<b>52</b>	<b>20</b>	0
Paddy	0	0	0	<b>29</b>
Mixed cropping	4	1	1	5
Vegetables	7	0	1	1
Aquaculture	0	0	0	7

Vaishali, Rupandehi and Karnal are clearly dominated by paddy-wheat. Thus, only one production systems is recognized in these research grids. In Bagerhat, paddy dominates most villages. However, about a sixth of all villages see aquaculture as most important land use activity. Six out of these seven villages are located in the northern part of the grid. However, paddy dominated and mixed villages are also located there. In addition, paddy is of considerable importance also in the aquaculture dominated villages: 4 out these 7 villages include paddy 3 times within the nine ranking questions on crop production (rank 1-3 over three seasons), 4 villages mention paddy twice and 1 village once. On the other hand, aquaculture also frequently appears as important land use in the paddy dominated villages. Therefore, also within the Bagerhat research grid only one production system (paddy-aquaculture) is recognized.

#### *Livestock*

In Vaishali, Rupandehi and Karnal livestock is dominated by dairy production. In Vaishali and Rupandehi all three ranks are common to most villages in the grid; Vaishali: 1<sup>st</sup> dairy, 2<sup>nd</sup> small ruminants, 3<sup>rd</sup> poultry; Rupandehi: 1<sup>st</sup> dairy, 2<sup>nd</sup> small ruminants, 3<sup>rd</sup> draft animals. However, in Karnal the most common combination (1<sup>st</sup> dairy, 2<sup>nd</sup> small ruminants, 3<sup>rd</sup> draft animals) accounts for only about 30% of villages in the grid. In Bagerhat it appears that both dairy and poultry production are similarly important with small ruminants coming third.

Table 3: Livestock ranks in the IGPs

Rank1	Rank2	Rank3	Vaishali	Rupandehi	Karnal	Bagerhat
	.00	.00	3	0	1	0
		.00	1	0	3	0
	draft animals	small ruminants	5	0	3	0
		pigs	0	0	1	0
		poultry	1	0	3	0
	dairy animals	draft animals	0	0	1	0
		.00	6	0	0	0
dairy animals		draft animals	14	<b>33</b>	<b>6</b>	0
	small ruminants	pigs	0	2	0	0
		poultry	<b>50</b>	6	0	4
		fish	1	0	0	0
	pigs	draft animals	0	0	1	0
		small ruminants	0	0	1	0
	poultry	small ruminants	1	1	1	<b>19</b>
	other	draft animals	0	0	1	0
small ruminants	dairy animals	draft animals	0	8	0	0
		poultry	0	3	0	0
	draft animals	dairy animals	0	0	0	1
poultry	dairy animals	small ruminants	0	0	0	<b>15</b>
	small ruminants	draft animals	0	0	0	1
		dairy animals	0	0	0	2

### *Conclusion on production systems*

In all four research grids only one production system was found to be important. In Vaishali, Rupandehi and Karnal this is paddy-wheat with dairy animals while in Bagerhat this is paddy-aquaculture with dairy and poultry.

### *Village selection*

After having determined that only one production system was to be considered within each research grid, the agreed sample of 20 villages was randomly selected from each grid.

For this, a random number was assigned to each village. Villages located on the grid border were excluded. Similarly, the 10% smallest villages (by number of households) and the 10% largest villages were excluded in order to avoid having the sample influenced by extreme cases. A very small village of less than 20 households for example would often consist of only a certain type of households while very large villages of perhaps more than 1000 households would already have characteristics of a small town. In Karnal all identified villages were included as only 19 villages were finally considered.

### *Household census and household selection*

After having selected the 20 sample villages in each research grid a household census was conducted in these villages. For this a suitable village person was identified (e.g. school leaver, student). This person then listed all households within the own village and collected basic characterizing data for each household: Household identification (household head name, father's name, village name, hamlet name), household head (age, gender), household size, land (ownership

and cultivation) and livestock. In general the completion of the household census took 5 to 7 days for each village. The village enumerator was paid by listed household after checking for data quality.

Subsequent to the completion of the household census lists, the data were entered by members of the survey team and additional data entry staff. The total number of households in the 20 villages selected in each grid varied considerably by site: In Vaishali the household census includes 7953 households, in Rupandehi 2251 households, in Karnal 7270 households and in Bagerhat the household census lists 6250 households. Because the decision to move the research site in the Upper Gangetic Plains from Sangrur (Punjab) to Karnal (Haryana) was taken late, a household census was also performed in Sangrur. Here 6807 households are listed. The differences in village size between the village census and the household census data are not negligible. Partly, this may be due to differences in including or excluding hamlets. However, they also underline the inherent level of accuracy of village level data collection.

Following the implementation of the household census, the household sample for the household survey was selected. For this, households not cultivating any land and not keeping any livestock (large or small ruminants) were excluded as they don't have any direct involvement in agriculture. Then, each household was assigned a random number and ranked by this number. The first 200 households were selected for the survey. The second were identified as replacement households in cases households were not available during the survey period. Villages were not considered during the household selection process as it is not assumed that "village" will be an important factor during the analysis process, which would justify balancing the number of households per village. Also, travel distances within the research grid are very limited, so that it is not necessary to ensure a minimum number of selected households per villages in order to simplify survey logistics.

#### *Implementation of the survey*

The initial training of the survey team for India was conducted in Patna (Bihar) during the first week of July 2012. The team consists of two supervisors, four enumerators and two data entry operators. The two supervisors shared collecting preparatory data (identifying villages, village census, household census) and leading the survey teams during the household survey. The same survey team conducted the household survey in Vaishali (08/07/2012 to 05/08/2012), Rupandehi (09/09/2012 to 08/10/2012) and Karnal (13/10/2012 to 10/11/2012), as Hindi is sufficiently spoken in all these sites. Data entry was started in parallel to the actual survey at the survey site in order to discover data issues as soon as possible and to speed up the overall data collection phase.

For Bagerhat, where only Bengali is spoken, a new survey team was established with the help of a local NGO (SMKK). Their training was conducted by Dhiraj Singh at Bagerhat. Madhuresh, one of the survey supervisors, was also able to join the team for the final training and for the survey to ensure consistency and data quality. The two data entry operators also travelled to Bagerhat to improve data quality by entering data during the survey process. Currently, the survey is on-going. It was completed the first week of January 2013, cleaned dataset available by end of January.

## 3.2 East Africa (EA)

### *Nyando and Makueni (Kenya)*

The process of identification of production systems in Nyando and Wote involved: i) analysis of satellite high-resolution images, ii) transect drives through the grid, iii) group interviews, iv) individual interviews to key-experts, v) household interviews. Three production systems were identified based on land cover, production orientation and land use intensity. Verification was conducted on the ground through key stakeholders which involved officers from the Ministry of agriculture, Chiefs, opinion leaders, local farmers and own observation.

The three dominant production systems identified after verification on the ground were for Nyando: a) Crop-livestock with free-grazing local breeds (maize and sorghum based), b) Sugarcane-maize with cross-bred cattle, c) Dairy-perennials-maize based (tea, Napier grass). The three systems were delineated spatially. A list of villages was developed for each system, villages falling in the buffer or transition zones were filtered out. To cover variability within the larger production system eight villages were randomly selected. The other two systems were randomly assigned six villages each. Within each village ten households were randomly selected from the household lists for the survey. In Wote, the team identified two main production systems: i) crop-livestock mixed with local sheep, ii) crop-livestock mixed with dairy.

The village definition used is that described in the training manual. The village list was built with the help of the village elders who are in charge of various villages of which they know the boundaries. The household list was developed by using the list provided by the village elder as a starting point but verification was done by going through the village from one household to the other by numbering them, we found out additional household within some villages.

Based on the three systems identified the areas where they fall were marked. Most of the systems were falling within sub-location of which the boundaries are well known by the chief who are governing the areas, we used the same boundaries. It come out that the first system covered a larger area than the rest. A list of villages was developed in each system and villages falling in the buffer zones were eliminated from the list as they were impossible to distinguish actual system on them. Due to the wide coverage of system one it was randomly assigned 8 villages in order to cover the heterogeneity within the system. The other two systems were randomly assigned six villages each. Within each village ten household was randomly picked for the survey. The same process was used in Makueni site.

In Kenya, the training of enumerators and testing of questionnaires were carried out together by ILRI and ICRAF staff. Carlos Quiros and Mariana Rufino conducted the first training and testings for IMPACTlite in Nyando in March 2012. Joash Mango (ICRAF) and Ianetta Mutie (ILRI) conducted trainings in Wote in August 2012. Local partners implemented the data collection in Wote.

### *Lushoto (Tanzania)*

Definition of production systems in Lushoto was supported by the use of a satellite image of the grid. All villages in the grid were identified. After this exercise, the team conducted an inventory of farming activities at each village engaging the village authorities and extension staff. The farming activities inventory was based on the history and current farming systems. Activities considered were food crops, cash crops, livestock keeping, agroforestry and horticultural crops. Finally, and on the basis of the activities and their frequencies the grid was classified into three production systems namely: i) Production system 3 includes the uplands experiencing three rain seasons namely; short, intermediate (*muluwati in kisambaa*), and the long rains. This production system is dominated by maize and beans, fruits trees, some vegetables and some perennials (coffee, tea and woodlots). Majority of the householders keep crosses of exotic and local zebu cattle and some goats. ii) Production system 2 is characterized by maize and beans with cassava and some horticultural crops. This householders practice zero grazing with crosses of exotic and local cattle breeds. iii) Production system 1 is different from 2 and 3 in that householders only keep indigenous species of livestock.

The village list was built using the original list from the CCAFS Baseline survey block during the first CCAFS HHS baseline survey which basically was met the program protocol to identify, the villages, the households and lastly the 20 randomly households. In this case, the villages were listed from the same grid but grouped according to the existing production systems within the block. The household list was built through the village household list prepared by the village authorities for the old (7) villages and verified by the CCAFS before conducting the HHBS. In new villages the same procedure was used. What was new here is that we requested the old village's authority to update their household list and from there we followed the same procedure of randomizing them and came up with households to be respondents.

Process followed to identify production systems: The team went through each village and consulted the village government and extension agents and we were satisfied with the information and of course, the team especially the enumerators and the site coordinator had enough experience on the farming systems in the district as well as in the CCAFS grid. Determining the boundaries on the ground was more difficult but we based on the government boundaries or village boundaries to establish those three dominant production systems in the block of 10 km x 10 km.

Training of enumerators and testing of the questionnaires was conducted by Joash Mango from ICRAF. The survey was finalized by the end of July 2012, and the data was delivered by September 2012.

### *Borana (Ethiopia)*

The Borana household survey was conducted in 20 village clusters in Yabello and Arero woreda for 20 consecutive days; starting from September 18 – October 7, 2012. It involved five enumerators and one field supervisor. The four pastoralist associations (PAS) out of five (PAS) inside the 30 x 30

blocks were selected and only one village namely Fuldawa from Arero, which is located at the extreme corner of the block and inaccessible was deliberately excluded. Each cluster was chosen based on shared community enclosure which is owned, managed and utilized exclusively by the household in the cluster. The sampling frame was constructed using a total of 1150 households' list obtained from 20 clusters of the 4 Pastoral Associations (PAs). The sampling frame included 397 households from Denbela Saden, 387 from Dikale, 269 from Alona, and 97 from Gada PAs.

Table 4: List of study clusters in the Borana grid

Wereda	PA	Clusters	Clusters' name
Yabello	Denbelasadden	7	Tadech Denbela; Doyo Duba; Guyo Kuyo; Tuke Halake; Bule Arero; Boru Goliso; Dureti Karata and Dida Adi)
Yabello	Dikale	5	Jirmo Dida; Guyo Jateni; Gelgelo Bule; Elman Simpere and Elman Eiya
Arero	Alona	6	Debeso Jateni; Wako Elema; Jateni Molu; Kotola Soka; Doyo Guyo; Gutu Kela
Arero	Gada	2	Konso Dida; Halake Goyo
	4	20	

The settlements pattern and the clusters in Arero were more scattered over a vast area than the settlements in Yabello, which are much more consolidated in specific areas. The households in the sample clusters were listed using key informants, elders, local development agent and PA leaders. Ten households per village were selected randomly. A random access table was used to select households from the list. Only few replacements were made in 25% of the selected 20 clusters. This was done based on satisfactory reasons and confirmations for absence of the selected respondents from the locality. Key informants from among the herders, elders, PA leaders and government pastoral development and landuse and administration experts were used to define the production system prevailing in the study block. A consensus was reached by most of the key informants that there is only one production system that is a pastoral production system; hence the block was categorized under pastoral system. This is in line with the results of the household baseline survey of CCAFS carried to characterize the block. Two hundred households 10 from each cluster were interviewed under a single production system. All the croplands were small size, opportunistic, and fragmented subsistence type virtually with no use of inputs at all.

The purpose of the survey was well introduced to cluster leaders before listing households, sampling and data collection. Once confidentiality issue ensured respondents became fully

cooperative and expressed their willingness to participate in the survey. Time was taken to describe the objectives of the research and respondents' willingness, feelings and reactions were assessed before questionnaires were filled out. This helped out the trustworthiness of information obtained. No one has shown unwillingness to participate. There were few replacements made because of satisfactory reason for the absence of the sample households from the area during the survey. Randomly selected replacements are made as per the procedures.

Five enumerators and 1 field supervisor were involved to cover one cluster in a day. The training of enumerators and testing of the questionnaires was conducted by Mariana Rufino and Solomon Desta in August 2012. Trained enumerators were used to fill out the questionnaires throughout the survey. Each enumerator filled 40 questionnaires in twenty days. The questionnaire typically lasted in average between 2.30 – 3.00 hours with each respondent. Enumerators are supervised during the data collection using available time frame. The mobile phone helped further to communicate and troubleshoot problems encountered by the enumerators at times when the supervisor is engaged in GPS recording and other activities. Each day the questionnaires filled were checked for completeness, clarity and consistency and discussed with enumerators each morning before meeting respondents for data collection. A minimum of 45 – 60 minutes per day is spent each morning with enumerators before survey began.

Major challenges encountered: i) inaccessibility of some of the clusters due to poor access roads, ii) the extended unusual short rain blocked road access to some of the cluster villages, iii) villages especially in Arero were scattered over a wider area and that made travel distances between households cumbersome for taking GPS coordinates. The survey was successfully finished in October 2012, and the data was delivered in November 2012.

#### *Hoima and Rakai (Uganda)*

To determine production systems in the two grids in Uganda pre-determined GPS coordinates were used to demarcate the 10 by 10 kilometer area by overlaying the coordinates on shape file of Uganda parishes in ArcView GIS 3.3 software. After identification of the parishes that lie within two grids, we approached district officers at the respective agricultural production departments to brief them on the research we were to carry out and for possible important contacts. There was information at the district level about the farming system (crops and livestock produced) but too general. More precise information regarding farming systems at the village level was obtained from parish leaders and village local council leaders. In addition, transect walks across the grids were carried out to complement on information obtained from local and village leaders.

The Hoima grid comprises four parishes: Buraru, Bulindi, Kibugubya in Hoima district and Kahembe in Masindi district. The householders from the three parishes of Hoima district are mainly cultivating maize, beans, cassava, bananas and a few keep local indigenous livestock. Ten villages were randomly selected from which one hundred farmers were randomly chosen, ten from each village. In Kahembe Parish (Masindi) maize, beans, banana, cassava, sugarcane and few local livestock are the major farming activities. This parish is in close proximity to the Kinyara sugar

factory so sugarcane production is taking root in the area. In this parish there were 7 villages from which 100 farmers were randomly sampled from the village list. These two situations in the Hoima block were first treated as two different production systems with sugarcane production being the differentiating factor. One hundred farmers were interviewed in each of the systems however upon random selection of farmers in the system which has sugarcane only around 20% of the farmers interviewed had sugarcane. Therefore, the Hoima grid was treated as a single production system since sugarcane farmers in the parish were not enough to qualify as a different production system.

In the Rakai grid, six parishes fall within the grid: Kiyovu, Kasensero, Bitabago, Buyamba, Butiti and Byakabanda. Across all the villages, there were two major crop components, the perennial crops (banana and coffee) and annuals (mainly maize, beans, cassava, groundnuts and sweet potatoes). Farmers in this grid also keep local livestock like cattle, goats, poultry although in small numbers. Therefore, one production system was identified in this grid: Coffee-banana with annuals and few local livestock. A total of twenty eight villages were randomly selected from which 200 farmers were randomly selected from the village lists.

The training of enumerators and testing of questionnaires took place in March 2012, and conducted by Mariana Rufino, Carlos Quiros, Silvia Silvestri (ILRI) and Joash Mango (ICRAF). This was the second training of enumerators of the whole project. The purpose of having such a large team was to agree on the contents of the training so that we could split responsibilities for other sites. Josh mango came back to Uganda to support the start of the survey in June 2012. Surveys were completed by September 2012, and the data delivered in December 2012. The local team at Uganda encountered difficulties with data entry, so finally data was entered at the Kisumu office of ICRAF under the supervision of Joash Mango.

### **3.3 West Africa (EA)**

#### *Kaffrine (Senegal)*

The list of villages for the Kaffrine grid was established. There were some difficulties as some names on the list from CCAFS did not correspond exactly to the names of villages they had. Two villages from the list of CCAFS were not encountered in the actual list of villages: Moula Ndiaga and Sare Lamou. The identification of the production systems in Kaffrine was based on a consultation with the key services active in the region (Agriculture, Water and Forests, Ecology, ISRA, ANCAR) and a series of documents: i) a soil map of Senegal, showing the areas with crop and livestock production, ii) an hydrologic map of the region of Kaffrine ("Direction de la Gestion et de la planification des Ressources en Eau" - DGPPE), iii) a map showing the forest resources ("Centre de Suivi Ecologique" - CSE), iv) a map of Kaffrine, v) the local development plans of Malem Hodar and of the rural community of Kahi, vi) a document from ISRA on the characterization and the typology of farms in the region of Kaffrine.

At first, only one system had been identified by the local agricultural services: a cropping system with a biennial rotation groundnut/cereal. But some more discussion allowed identifying 3

production systems for the block (Fig. 5 Annex): a) Agriculture and forestry (31 villages), where a development of some agroforestry activities can be noticed with the proximity of classified forests, in addition to the cereal and groundnut cultivation (Zone 1); b) Mixed crop-livestock system (30 villages), in a more pastoral area (Zone 2); c) Crops and vegetable production (62 villages), where a NGO (World Vision) drilled wells (Zone 3).

The list of villages for each production system was established. Villages in transitions zones between two systems were excluded from the lists (6, 4, and 11 villages for the production systems a, b and c, respectively). Villages were randomly selected for each production system for a total of 20 villages, with 7, 6, and 7 villages for the production system a, b and c, respectively. One village (Keur Sandao) of the production system b (mixed crop-livestock systems) has been replaced as it had less than 4 households: most of the villagers migrated because of floodings. This village was replaced by the village of Kahi, after a random selection.

The villages selected are: a) Agriculture and forestry (7): Gorla Mbande, Mbella Ouolof (Mbella Saloum), Ngalick, Khende, Diagle, Ndodji, Nianghene Ouolof; b) Mixed crop-livestock system (6): Bagana, Kanka, Kebe Keur Lahine, Korke Bambara, Moukhoume, Kahi; c) Crops and vegetable production (7): Loumene, Gainth Gouye, Gainth Peulhi, Ngatou Malick, Medina Ndiayene, Mbene Diouma, Ngidiba

A phase of sensitizing was carried on between the 18 and the 27th of June 2012, to meet the chiefs of the villages and the population and explain how would the survey would be organized. During this first visit, the actual lists of households were established for each village with the chiefs. Then, 10 households were randomly selected per village, for a total of 200 households.

The training of enumerators and testing of the questionnaires took place in May 2012 and conducted by Sabine Douxchamps (IWMI-ILRI), Mariana Rufino and Yacine Ndour. The survey was finished by September 2012 and the data delivered in November 2012.

#### *Tougou (Burkina Faso)*

The list of villages from the CCAFS baseline survey was confirmed. The site of Tougou, in the Northern Region of Burkina Faso, comprises four rural communities (Namissiguima, Ouahigouya, Barga, and Titao) and 51 villages. Together with the technical services (chefs ZAT – Zone d'Appui Technique) of the communities of Namissiguima, Ouahigouya and Barga, and the Province Director of the Lorum, three production systems were identified: i) mixed crop-livestock system (25 villages). There can be a dominance of either crop or livestock. This system occupies most of the area; ii) mixed crop-livestock system + vegetables (20 villages). Vegetable cropping during the dry season if some water is available; iii) mixed crop-livestock system + agroforestry (3 villages).

There is no clear separation between the systems. The whole area is under mixed crop-livestock system, and then the two other systems are scattered here and there, depending if there is a source of water during the rainy season (Dam of Tougou, wells, or dugouts) or a forest. Vegetable growing

and agroforestry would then represent an additional source of diversification of the basic crop-livestock system. All key informants agreed on this. There was never only one production system in a village, but always a mixture. The dominant production system in a village (i.e. more than about 60% of the household practice it) defined to which production system the village would be assigned.

An important non-agricultural activity in the region is gold washing: the 3 villages concerned by this activity were discarded before the random selection. Seven villages were randomly selected by production system, except for the mixed system with agroforestry where only 3 villages were available, and were all selected.

- i) mixed crop-livestock system: Rapougouma, Longa, Sillia, Salla Foulbe, Todiam, Hargo, Poukouma ramssa, Ramdolla peul
- ii) mixed crop-livestock system + vegetables: Dinguiri, Karma, Lemnogo mossi, Sabouna, Rikou, You
- iii) mixed crop-livestock system + agroforestry: Tougou, Solgom, Bagayalگو

The lists of households per villages were established with the technical services and the Villagers Development Council (“Conseil Villageois de Developpement”) of each village. Then, 10 households were randomly selected from the list for each village of the mixed crop-livestock system and the mixed crop-livestock system + vegetables production systems, and 20 households were selected per village for the mixed crop-livestock system + agroforestry system, so in total 200 households. The training of enumerators was conducted in June 2012 by Sabine Douxchamps. The survey ended September 2012 and the data was delivered in November 2012.

### *Cinzana (Mali)*

Samples villages were selected in the rural communes of Cinzana and Katiéna. Criteria used for villages’ selection were: i) villages within the block of 30x30 km<sup>2</sup>, ii) permission from the village authorities/elders to conduct the survey, iii) representative villages (size and inhabitants) among the villages of the block, iv) ease of access (road).

The selection of villages was done with extension services and IER team led by Lamissa Diakité. Following the introduction on the CCAFS programme, the activities/projects conducted over the past two years at the Segou site, and presentation of the objectives of the survey, 20 villages were selected from the total list of 46. There is about 12 805 households and 56 744 inhabitants in the block. The block is homogenous (from a physical and socioeconomic perspectives), and therefore very little difference between villages and households. To reach 200 households among the 20 villages, samples of 10 households were selected in each of the village. In each village, households were selected from the census list available at the village level. The census list was updated beforehand. A random sampling approach was used whereby all the households listed were put together in a hat and 10 households were selected randomly.

The identification of the production system was done through grey literature and consultation of key informants such as extension services, rural development projects operating in the area, villages' elders and local decentralized public officers (agriculture, environment, livestock and fisheries). From this process, only one production system (agro-pastoral, with agriculture as the main component and extensive livestock production as the second component) was identified and agreed upon by all the stakeholders. The training was conducted by Abdoulaye Moussa from the CCAFS West Africa office in June 2012. The survey was finished by October 2012 and the data delivered in December 2012.

### *Fakara (Niger)*

The Niger household survey was conducted in 46 villages in 2012, for 15 consecutive days; starting from 11th of August 2012 to 25th of August 2012. In order to identify the production systems the site coordinator has carried out an expert consultation on site. The expert that has been consulted has been working in the research area for about 20 years, and has been collaborating with different research institutes.

The following two production systems have been identified:

1. Subsistence crops and livestock farming with local species. Specifically this production systems presents: Subsistence crops such as: millet, sorghum, cowpea, sesame, maize, peanut, okra and Livestock farming with local species: oxen, goat, sheep, chicken, guinea fowl.
  
2. Subsistence crops, market gardening and livestock farming with local species. Specifically this production system presents: Subsistence crops such as: millet, sorghum, cowpea, sesame, maize, peanut, okra, Market gardening: cabbage, potatoes, salad, onion, tomato, gourd, courgette, carrot, sweet potatoes, cassava, Cultivation of Moringa, Livestock farming with local species: oxen, goat, sheep, chicken, guinea fowl.

The market gardening is practices during the dry season. The Moringa is cultivated the entire year and both leaves and grains are commercialized. Most of the market gardening products and Moringa are sold.

The identification of the list of villages has been based on the map 'CCAFS\_hbs\_Fakara\_Niger /Icrisat GIS lab : Novembre 2010'. In this map are localized the 46 CCFAS villages/sites in Niger. In each of the two clusters of villages established on the basis of the two production systems, a random selection has been done to select 10 villages, 5 for each of the production system. The selected villages are reported in bold in table 5. In the table 5 is represented the distribution of the villages according with the production system.

Table 5 - Distribution of the villages according with the production system. In bold are indicated the villages selected for the survey.

Production systems	Villages with a specific production system
Subsistence crops and livestock farming with local species	<b>1. Baboussay</b> 2. Bari Touri

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Subsistence crops, market gardening and livestock farming with local species

- 3. Touliel**
  4. Darey
  5. Dolohi
  6. Balal Sagui
  7. Fandou Béri
  8. Fetokadie
  9. Fandobong
  10. Kida Bazagaize
  11. Koma Koukou
  12. Touloua Kouarey
  - 13. Bagoua**
  14. Tigo Tegui (Abamate)
  15. Gorou Yena
  - 16. Tondi Kiboro**
  17. Sama Dey
  18. Boundou Warou
  19. Ko Kaina
  20. Boula Darey
  21. Kampa Zarma
  22. Kampa Peul
  23. Kida Tafa Kouara
  24. Karbanga
  - 25. Katanga**
  1. Dantiandou Tegui
  2. Maourey Koiria Zeno
  3. Maourey Tokobinkani
  4. Sabou Dey
  5. Youloua
  - 6. Bankadey**
  - 7. Gasseйда**
  8. Gao Bangou
  9. Guileyni
  10. Zoroney
  11. Dantiandou
  12. Bokossay
  13. Falanga
  14. Dey Tegui
  - 15. Tigo Zeno**
  16. Korto
  - 17. Yerima Dey**
  18. Gorou
  19. Banizoumbou
  - 20. Boundou**
  21. Kalassi
- 

For each village the list of the households has been compiled. The choice of the households to interview has been done during an assembly in each one of the selected villages. All the social categories have been taken into account when sampling the villages. Two hundred households, 100 from each production system were interviewed.

Five enumerators and 1 field supervisor were involved. Trained enumerators were used to fill out the questionnaires throughout the survey. Each enumerator filled 40 questionnaires in 15 days. The questionnaire typically lasted in average 1 hour and 30 minutes with each respondent. The survey activity did not present any particular problem of implementation. This may have been due to the

fact that the chiefs of the villages together with opinion leaders have been informed before the beginning of the survey and were fully involved in all steps.

The training was conducted by Silvia Silvestri (ILRI) and Abdoulaye Moussa in June 2012. The survey was finished by November 2012, and until 1 February 2013 there are some issues with data delivery.

## 4 Status of data across sites

Because of planning and budgetary constraints, the start of the implementation of the surveys varied across the sites and regions (see Table 4). For the IGPs, the surveys started later than at the other regions, partly because there was no consensus on which were the CCAFS benchmark sites to be surveyed. At the moment, there still one site where the survey has not finished. We expect that the dataset will ready by the end of January 2013.

Table 4: Current status of the implementation of the surveys across sites

	CCAFS site		Production system identified	Survey started	Survey finished	Data entered	Data delivered	Contact person	IMPACTlite team facilitator
1	Nyando	KE	Feb-12	Mar-12	May-12	May-12	Jun-12	Joash Mango	Joash Mango
2	Hoima	UG	Jun-12	Jun-12	Aug-12	Oct-12	Dec-12	Ibrahim Wanyama	Joash Mango
3	Rakai	UG	Jun-12	Jun-12	Sep-12	Oct-12	Nov-12	Ibrahim Wanyama	Joash Mango
4	Lushoto	TZ	Jul-12	Jul-12	Aug-12	Sep-12	Oct-12	George Sayula	Joash Mango
5	Wote	KE	Jul-12	Aug-12	Sep-12	Oct-12	Oct-12	Ianetta Mutie	Joash Mango
6	Borana	ET	Aug-12	Sep-12	Oct-12	Oct-12	Nov-12	Solomon Desta	Mariana Rufino
7	Lawra	GH	Jun-12	Oct-12	Nov-12	Feb-13	Feb-13	Jesse Naab	Abdoulaye Moussa
8	Tougou	BF	Jun-12	Aug-12	Sep-12	Oct-12	Nov-12	Leopold Some	Sabine Douxchamps
9	Cinzana	MA	Jun-12	Aug-12	Nov-12	Oct-12	Dec-12	Diakit� Lamissa	Abdoulaye Moussa
10	Kaffrine	SE	Jun-12	Aug-12	Sep-12	Oct-12	Nov-12	Yacine Ndour	Sabine Douxchamps
11	Fakara	NI	Jun-12	Aug-12	Nov-12	Oct-12	Jan-13	Moussa Boureima	Silvia Silvestri
12	Vaishali	IN	Jul-12	Aug-12	Aug-12	Sep-12	Sep-12	Dhiraj Singh	Nils Teufel
13	Karnal	IN	Oct-12	Oct-12	Nov-12	Nov-12	Dec-12	Dhiraj Singh	Nils Teufel
14	Rupandehi	NE	Sep-12	Sep-12	Oct-12	Oct-12	Dec-12	Dhiraj Singh	Nils Teufel
15	Bagerhat	BA	Dec-12	Dec-12	Jan-13	Jan-13	Jan-13	Dhiraj Singh	Nils Teufel

## 5 Data analysis

### 5.1 Calculation of performance and livelihood indicators

Once the data was processed, cleaned and documented, we generated scripts to calculate a number of performance and livelihood indicators (Table 5). These indicators are appended to the database and will be used for within and across site comparisons, and for modeling studies.

Table 5: List of indicators calculated using variables extracted from the household survey database.

Variable name	Description
Incomeland	Income from Leasing land out (\$)
Expense land	Cost of leasing land out (\$)
Cropincome	Gross income from sale of crops (\$)
Croplabour	Cost of hiring labour (\$)
Cropinputs	Cost of crop inputs used on farm (e.g seeds) (\$)
Liveincome	Income from sale of livestock products (\$)
Liverumsold	Income from sale of livestock species (\$)
Livefeed	Cost of livestock feed used (\$)
Liveinputs	Cost of livestock inputs used (e.g. supplements) (\$)
Livelabour	Cost of labour for livestock (\$)
Otherincome	Off-farm income (e.g remittances) (\$)
Otherexpense	Household expenses (e.g. school fees) (\$)
Totalarea	Total area of farm (ha)
Totalplots	Total area of plots (ha)
Totalcrops	Total area of crops (ha)
Totalhhsiz	Number of household members
Totalcattle	Total cattle (no's per household)
Totalgoats	Total goat (no's per household)
Totalsheep	Total sheep (no's per household)
Totalfamcrplabour	Family labour used on crops (Mandays per season)
Totalfamvlabour	Family labour used on livestock keeping (Mandays per season)

## 5.2 Income calculations

Total net income, cash income, non-cash income and off-farm income for the household were calculated using revenues from livestock, crops, value of consumed food products and as shown in equations (1), (2), (3) and (4).

*Total net income*

$$T\_inc_i = L_{sale} + C_{rsale} + VP - L_{cost} - C_{rcost} \quad (1)$$

where:

$T\_inc_i$  is total annual income for household  $i$

$L_{sale}$  is annual income from livestock sales

$C_{rsale}$  is annual income from crop sales

$VP$  is the annual monetary value of consumed farm produce

$L_{cost}$  are the annual direct costs of livestock production

$C_{rcost}$  are the annual direct costs of crop production

*Cash income*

$$C\_inc_i = Lsale + Crsale \quad (2)$$

where:

$C\_inc_i$  is the annual cash income for household  $i$

$Lsale$  is the annual income derived from livestock sales

$Crsale$  is the annual income from crop sales

*Non-cash income*

$$NC\_inc_i = T\_inc_i - C\_inc_i \quad (3)$$

where

$NC\_inc_i$  is the annual non-cash income for household  $i$

Off-farm income (4) was the sum of the cash earned from all  $j$  off-farm activities the household members are engaged in:

$$Off\_inc_i = \sum_{j=0}^n (Off\_farm\ income)_j \quad (4)$$

where

$Off\_inc_i$  is the annual off-farm income of household  $i$

$Off\_farm\ income_j$  is the revenue from each  $j$  off-farm activities

Poverty line at household level (5) was calculated by considering household size, an income of USD 1.25 per capita per day, and a conversion rate of 1USD= 95 Kenyan shillings.

$$PovLine_i = HHsize \times 1.25 \times 365 \times 95 \quad (5)$$

where

$PovLine_i$  is the poverty line expressed as annual income in Kenyan shillings for household  $i$

$HHsize_i$  is the number of members of household  $i$

### 5.3 Crop diversity and activity diversity

Crop diversity (6) was the maximum number of crops grown by the households in a site.

$$CropDiv_k = \max NumCrops_i \quad (6)$$

where

$CropDiv_k$  is the crop diversity for site  $k$

$Max NumCrops_k$  is the maximum number of crop grown by the  $i$  households at site  $k$

Activity diversity (7) is the maximum number of farm and non-farm activities households are engaged in a site.

$$ActDiv_k = \max NumAct_i \quad (7)$$

where

$ActDiv_k$  is the activity diversity for site  $k$

$Max NumAct_i$  is the maximum number of activities in which the  $i$  households are engaged at site  $k$

#### 5.4 Food security and food self-sufficiency

Energy availability was calculated for each household based on production data and food consumption. Households reported food items produced on-farm and those purchased on a weekly basis, indicating seasonal differences. With this information we calculated a food security ratio (FSR) as shown in equation (8) and a food self-sufficiency ratio (FSSR) as shown in equation (9) to reflect the reliance on farm production and purchases to meet energy needs, calculated using World Health Organisation standards.

FSR includes total energy in available food (purchased and on-farm produce) divided by total energy requirements for the household family. FSSR is total energy in on-farm produce divided by total energy requirements for the household family.

$$FSR_i = \frac{\sum_{m=1}^p (QtyC_m \times E_m) + (QtyP_m \times E_m)}{(\sum_{j=1}^n K_j)} \quad (8)$$

$$FSSR_i = \frac{\sum_{m=1}^p (QtyC_m \times E_m)}{(\sum_{j=1}^n K_j)} \quad (9)$$

where:

$FSR_i$  is the food security ratio for household  $i$

$FSSR_i$  is the food self-sufficiency ratio for household  $i$

$QtyC_m$  is the quantity of food item  $m$  produced on-farm that is available for consumption (kg or litre)

$QtyP_m$  is the quantity of food item  $m$  purchased that is consumed (kg or litre)

$E_m$  is the energy content of food item  $m$  (MJ kg<sup>-1</sup> or litre)

$K_j$  is the energy requirements in MJ per capita for  $j$  member

$n$  is the number of members in household  $j$

#### 5.5 Household diet diversity score

The HDDS is the sum of all food groups consumed by the household divided by the total possible food types. The types of food considered were categorized to 8 main food groups: Main staples, vegetables, fruits, pulses, meat and fish, milk, oil and sugar (Table 6).

Table 6: Food groups used to describe diet items in the analysis of food consumption

Types of foods	Groups
A. Millet, sorghum, maize, rice, wheat or other local grains e.g. ugali, bread, rice	<i>Main Staples</i>
B. Potatoes, yams, cassava or foods made from roots or tubers	
C. Vegetables	<i>Vegetables</i>
D. Fruits	<i>Fruits</i>
E. Beans, peas, lentils or nuts	<i>Pulses</i>
F. Red meat, pork, lamb, goat, rabbit, wild game	<i>Meat and Fish</i>
G. Poultry including chicken and duck	
H. Eggs	
I. Fresh or dried fish or shell fish	
J. Milk, cheese, yoghurt or other milk products	<i>Milk</i>
K. Oils and fats	<i>Oil</i>
L. Sugar, sweets, honey	<i>Sugar</i>

Source: World Food Programs vulnerability assessment mapping (WFP, 2008)

If the household consumed a food type, then it had a score of 1, otherwise zero.

$$HDDS = \frac{\sum \text{food groups consumed}}{\text{Total food types}}$$

## 5.6 Household domestic asset index

The asset index analysis is adapted from analyses recommended for all Bill and Melinda Gates funded projects. It is calculated for all movable assets. Each of the assets is assigned a weight (w) and then adjusted for age (*Agricultural Development Outcome indicators, 2010*).

$$\text{Asset index}_i = \sum_{g=1}^G \left[ \sum_{i=1}^N (w \times a) \right]$$

where,

W= weight of the *ith* item of asset g

N=number of asset g owned by household

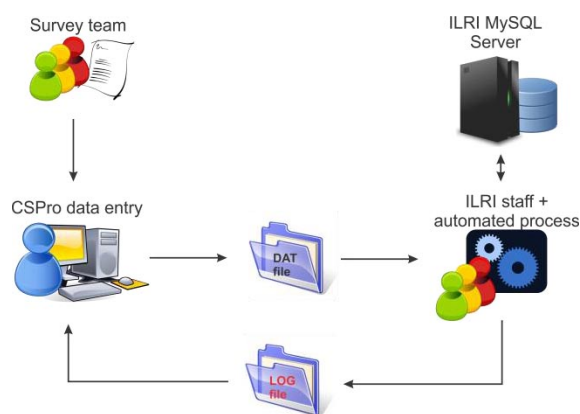
A=age adjustment to weight

G= number of assets owned by household

## 6 Data management and databases

### 6.1 Data management

The data management process relied on a software system called CPro for entering and editing the survey data. Data entry was performed at each site by one member of the team. On completion of data entry each site submitted a DAT file to ILRI headquarters in Nairobi for processing, transforming and storing the data into a standard MySQL database. The DAT passed through a series of automated processes generating error log files describing diverse problems with the data. Each tier of processing was followed by constant interaction between ILRI staff and the site team to resolve the problems. The result is 15 consistent and standard<sup>1</sup> databases storing detail information of 3000 households. The following diagram shows the data management process.

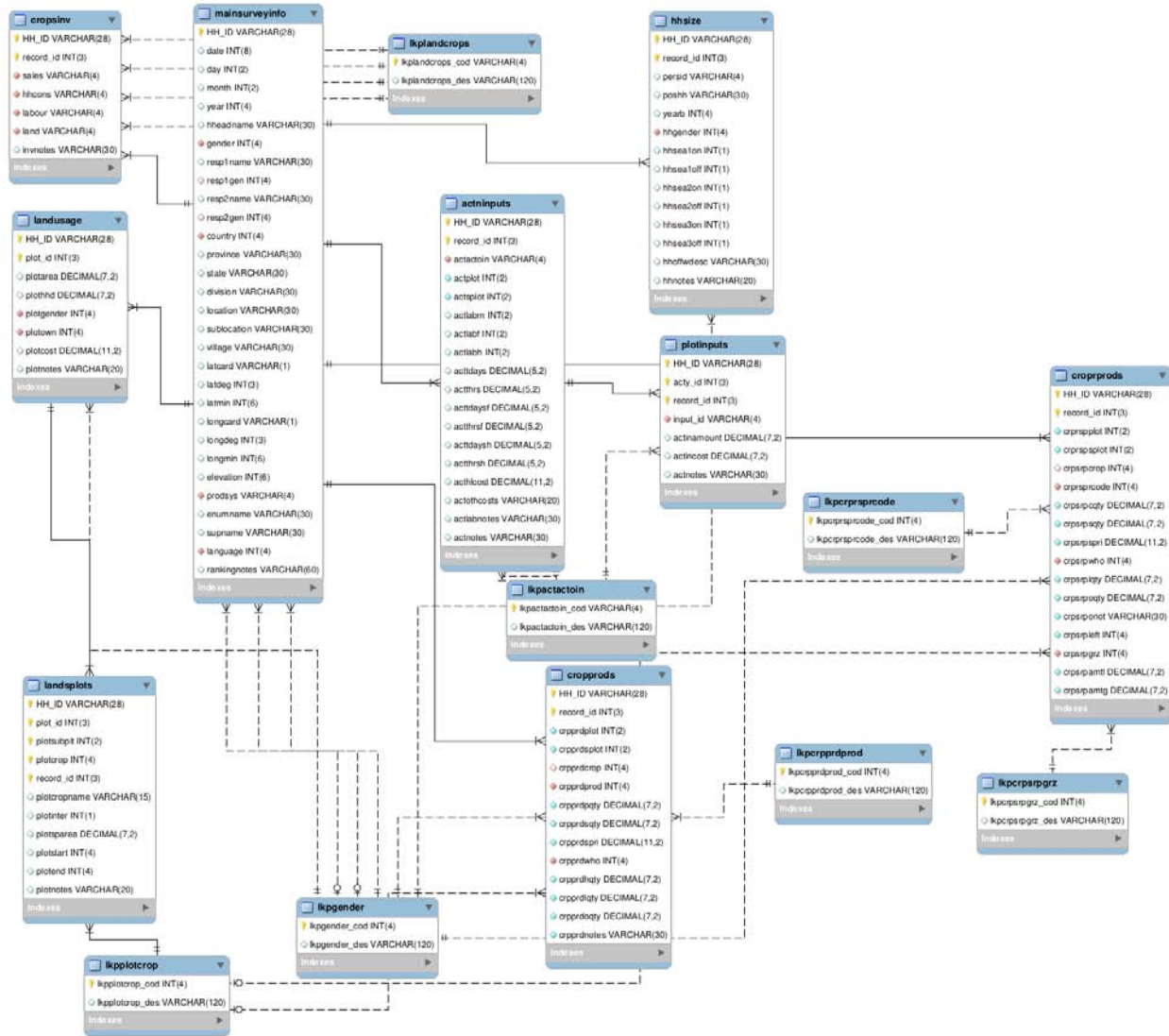


## 6.2 Database schema

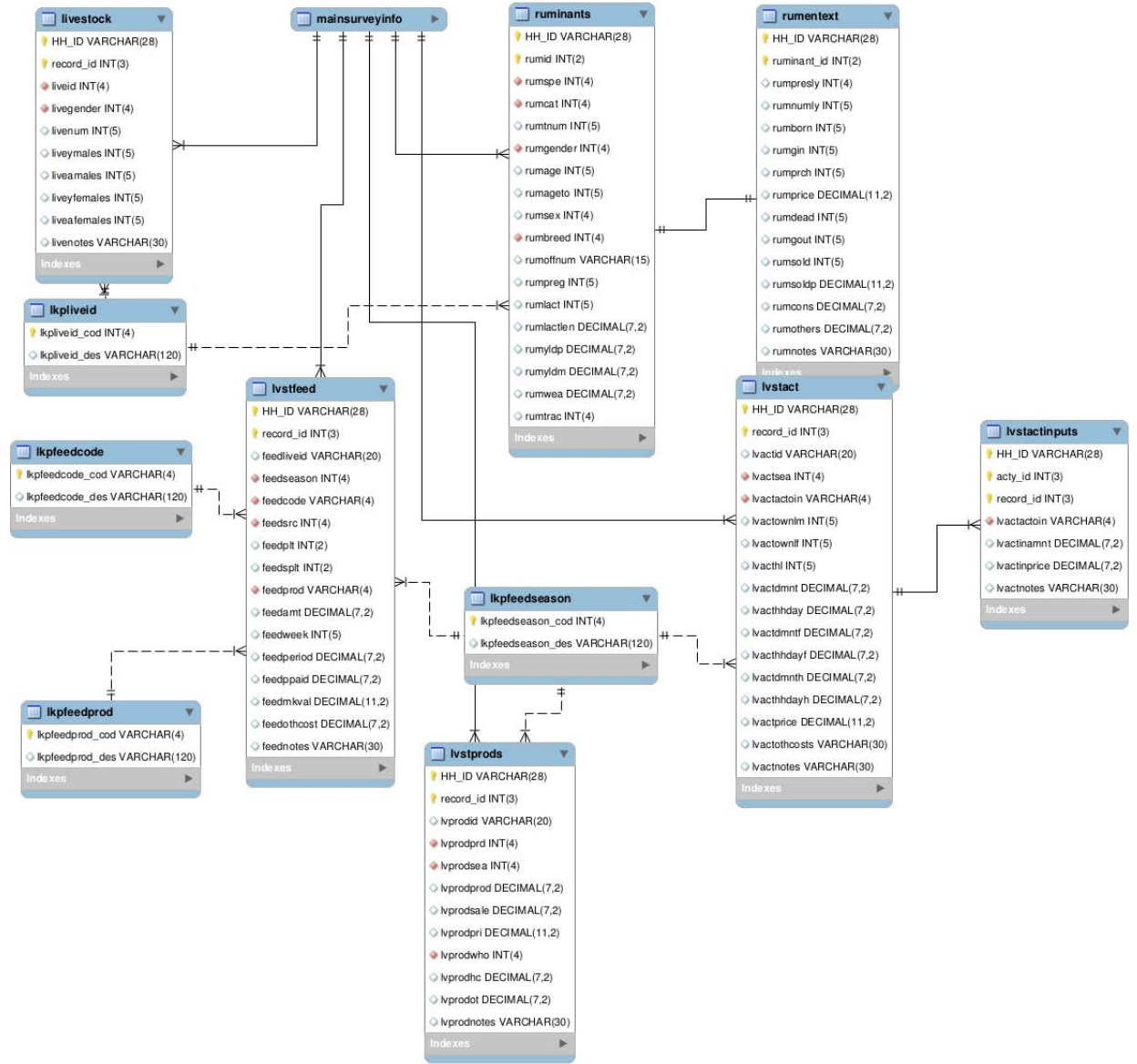
The data for each site is stored in a MySQL database in 22 tables with 27 supporting lookup tables. The following images show a graphical representation of the database separated in three main sections: a) Crops, containing the generic information of the household plus data on crop, plots, management activities and crop production; b) Livestock, containing information about livestock numbers, management activities and production and; c) Other, containing information about other sources of income and expenses plus household consumption patterns.

<sup>1</sup> Surveys in the IGP region are almost standard with the rest except for the household consumption forms.

# Crops section



# Livestock section





lkpactactoin	Activity / input	Yes
lkpasset	Assets	Yes
lkpcountry	Country	Yes
lkpcrprdprod	Product	Yes
lkpcrprsprcode	Residue	Yes
lkpcrpsrprgrz	Grazing	Yes
lkpexpcode	Expense	Yes
lkpfeedcode	Feed	Yes
lkpfeedprod	Feed product (if source is on-farm)	Yes
lkpfeedseason	Season	Yes
lkpfeedsrc	Feed source	Yes
lkpgender	Gender of household head	Yes
lkphhcoffperiod	Frequency period	Yes
lkphhconprod	Product	Yes
lkphhcontime	Timing (Good / Bad)	Yes
lkpincome	Income	Yes
lkpincperiod	Period	Yes
lkplandcrops	Taking most of the land	Yes
lkplanguage	Language used in interview	Yes
lkpliveid	Livestock	Yes
lkplvactactoin	Activity / input	Yes
lkplvprodprd	Product	Yes
lkpplotcrop	Crop / aquaculture species	Yes
lkpplotown	Land ownership	Yes
lkpprodsys	Production System	Yes
lkprumbreed	Breed	Yes
lkprumcat	Category	Yes
lvstact	Livestock activities	No
lvstactinputs	Livestock inputs	No
lvstfeed	Livestock feeding	No
lvstprods	Livestock production	No
mainsurveyinfo	Main Survey Information	No
otherexpen	Other expenses	No
otherincome	Other income	No
plotinputs	Crop activity inputs	No
rumentext	Ruminant enter and exit	No
ruminants	Ruminant livestock species	No

*List of columns in each table*

<b>Table</b>	<b>Column</b>	<b>Description</b>	<b>Data type</b>	<b>Primary Key</b>
actninputs	actactoin	Activity / input	varchar(4)	Yes
actninputs	acthlcost	Hired labour cost (Ksh / hour)	decimal(7,2)	No
actninputs	actlabf	Labour (Female)	int(2)	No
actninputs	actlabh	Labour (Hired)	int(2)	No
actninputs	actlabm	Labour (Male)	int(2)	No
actninputs	actlabnotes	Notes on labour	varchar(30)	No

actninputs	actnotes	Notes	varchar(30)	No
actninputs	actothcosts	Oher costs	varchar(20)	No
actninputs	actplot	Plot	int(2)	Yes
actninputs	actsplot	Subplot	int(2)	Yes
actninputs	acttdays	Male frequency (Days / month)	decimal(5,2)	No
actninputs	acttdaysf	Female frequency (Days / month)	decimal(5,2)	No
actninputs	acttdaysh	Hired frequency (Days / month)	decimal(5,2)	No
actninputs	actthrs	Male time (Hours / day)	decimal(5,2)	No
actninputs	actthrsf	Female time (Hours / day)	decimal(5,2)	No
actninputs	actthrsh	Hired time (Hours / day)	decimal(5,2)	No
actninputs	HH_ID	household id	varchar(28)	Yes
cropprods	crpprdcrop	Crop	int(4)	No
cropprods	crpprdhqty	Consumption (kg)	decimal(7,2)	No
cropprods	crpprdlqty	Livestock feeding (kg)	decimal(7,2)	No
cropprods	crpprdnotes	Notes	varchar(30)	No
cropprods	crpprdoqty	Other use (kg)	decimal(7,2)	No
cropprods	crpprdplot	Plot	int(2)	No
cropprods	crpprdpqty	Production (kg)	decimal(7,2)	No
cropprods	crpprdprod	Product	int(4)	No
cropprods	crpprdsplot	Subplot	int(2)	No
cropprods	crpprdspri	Sale price (Ksh / kg)	decimal(7,2)	No
cropprods	crpprdsqty	Sales (kg)	decimal(7,2)	No
cropprods	crpprdwho	Who controls the income	int(4)	No
cropprods	HH_ID	household id	varchar(28)	Yes
cropprods	record_id	Record ID	int(3)	Yes
croprprods	crprsplot	Plot	int(2)	No
croprprods	crprsprcode	Residue	int(4)	No
croprprods	crprspsplot	Subplot	int(2)	No
croprprods	crpsrpamtg	Amout grazed (kg)	decimal(7,2)	No
croprprods	crpsrpamtl	Amout left (kg)	decimal(7,2)	No
croprprods	crpsrpcqty	Collected (kg)	decimal(7,2)	No
croprprods	crpsrpcrop	Crop	int(4)	No
croprprods	crpsrpgrz	Grazing	int(4)	No
croprprods	crpsrpleft	Left on field	int(4)	No
croprprods	crpsrplqty	Livestock feeding (kg)	decimal(7,2)	No
croprprods	crpsrponot	Notes	varchar(30)	No
croprprods	crpsrpoqty	Other use (kg)	decimal(7,2)	No
croprprods	crpsrpspri	Sale price (Khs / kg)	decimal(7,2)	No
croprprods	crpsrpsqty	Sale (kg)	decimal(7,2)	No
croprprods	crpsrpwho	Who controls the income	int(4)	No
croprprods	HH_ID	household id	varchar(28)	Yes
croprprods	record_id	Record ID	int(3)	Yes
cropsinv	hhcons	Most important for household consumption	varchar(4)	No
cropsinv	HH_ID	household id	varchar(28)	Yes
cropsinv	invnotes	Notes	varchar(30)	No
cropsinv	labour	Taking most of the labour	varchar(4)	No
cropsinv	land	Taking most of the land	varchar(4)	No

cropsinv	record_id	Record ID	int(3)	Yes
cropsinv	sales	Most important for sales	varchar(4)	No
farmassets	asset35years	3 to 7 years	int(5)	No
farmassets	asset3years	< 3 years	int(5)	No
farmassets	assetfemale	Number owned by female	int(5)	No
farmassets	assetjoint	Number owned jointly	int(5)	No
farmassets	assetmale	Number owned by male	int(5)	No
farmassets	assetmore3	> 3 years	int(5)	No
farmassets	assetnotes	Notes	varchar(30)	No
farmassets	assetnown	Total number owned	int(5)	No
farmassets	asset_cod	Asset code	int(4)	Yes
farmassets	HH_ID	household id	varchar(28)	Yes
hhconsoff	hhcoffreq	Frequery of purchase (times / period)	decimal(7,2)	No
hhconsoff	hhcoffitem	Item	varchar(30)	No
hhconsoff	hhcoffperiod	Frequency period	int(4)	No
hhconsoff	hhcoffprice	Purchase price (Ksh / kg)	decimal(9,2)	No
hhconsoff	hhcoffqtyp	Quantity purchased (kg)	decimal(7,2)	No
hhconsoff	hhcofftime	Timing (Good / Bad)	int(4)	No
hhconsoff	hhconnotet	Notes	varchar(30)	No
hhconsoff	hhconperioe	Consumption period (months)	decimal(7,2)	No
hhconsoff	hhconqtz	Quantity consumed (kg)	decimal(7,2)	No
hhconsoff	hhconweel	How often in a week (days / week)	decimal(7,2)	No
hhconsoff	HH_ID	household id	varchar(28)	Yes
hhconsoff	record_id	Record ID	int(3)	Yes
hhconsper	bparp	April	int(1)	No
hhconsper	bpaug	August	int(1)	No
hhconsper	bpdec	December	int(1)	No
hhconsper	bpfeb	February	int(1)	No
hhconsper	bpjan	January	int(1)	No
hhconsper	bpjul	July	int(1)	No
hhconsper	bpjun	June	int(1)	No
hhconsper	bpmar	March	int(1)	No
hhconsper	bpmay	May	int(1)	No
hhconsper	bpnov	November	int(1)	No
hhconsper	bpoct	October	int(1)	No
hhconsper	bpsep	September	int(1)	No
hhconsper	gpapr	April	int(1)	No
hhconsper	gpaug	August	int(1)	No
hhconsper	gpdec	December	int(1)	No
hhconsper	gpfeb	February	int(1)	No
hhconsper	gpjan	January	int(1)	No
hhconsper	gpjul	July	int(1)	No
hhconsper	gpjun	June	int(1)	No
hhconsper	gpmar	March	int(1)	No
hhconsper	gpmay	May	int(1)	No
hhconsper	gpnov	November	int(1)	No
hhconsper	gpoct	October	int(1)	No

hhconsper	gpsep	September	int(1)	No
hhconsper	HH_ID	household id	varchar(28)	Yes
hhconsprods	hhconitem	Crop, livestock or aquaculture	varchar(4)	No
hhconsprods	hhconnotes	Notes	varchar(30)	No
hhconsprods	hhconperiod	Consumption period (months)	decimal(5,2)	No
hhconsprods	hhconplot	Plot	int(2)	No
hhconsprods	hhconprod	Product	varchar(4)	No
hhconsprods	hhcongty	Quantity consumed (kg)	decimal(7,2)	No
hhconsprods	hhconsplot	Subplot	int(2)	No
hhconsprods	hhcontime	Timing (Good / Bad)	int(4)	No
hhconsprods	hhconweek	How often in a week (days / week)	int(5)	No
hhconsprods	HH_ID	household id	varchar(28)	Yes
hhconsprods	record_id	Record ID	int(3)	Yes
hhsizer	hhgender	Gender	int(4)	No
hhsizer	hhnotes	Notes	varchar(20)	No
hhsizer	hhoffwdesc	Off-farm work description	varchar(30)	No
hhsizer	hhsea1off	Long rains off-farm	int(1)	No
hhsizer	hhsea1on	Long rains on-farm	int(1)	No
hhsizer	hhsea2off	Short rains off-farm	int(1)	No
hhsizer	hhsea2on	Short rains on-farm	int(1)	No
hhsizer	hhsea3off	Dry spell off-farm	int(1)	No
hhsizer	hhsea3on	Dry spell on-farm	int(1)	No
hhsizer	HH_ID	household id	varchar(28)	Yes
hhsizer	persid	Person ID	varchar(4)	No
hhsizer	poshh	Position in Household	varchar(30)	No
hhsizer	record_id	Record ID	int(3)	Yes
hhsizer	yearb	Year of birth	int(4)	No
landsplots	HH_ID	Household id	varchar(28)	Yes
landsplots	plotcrop	Crop code	int(4)	Yes
landsplots	plotcropname	Name of variety	varchar(15)	No
landsplots	plotend	End month	int(4)	No
landsplots	plotinter	Inter-cropping	int(1)	No
landsplots	plotnotes	Notes	varchar(20)	No
landsplots	plotsparea	Area of subplot	decimal(7,2)	No
landsplots	plotstart	Start month	int(4)	No
landsplots	plotsubplt	Subplot id	int(2)	Yes
landsplots	plot_id	Plot id	int(3)	Yes
landusage	HH_ID	household id	varchar(28)	Yes
landusage	plotarea	Area (acres)	decimal(7,2)	No
landusage	plotcost	Cost / return (Ksh if leased)	decimal(7,2)	No
landusage	plotgender	Gender ownership	int(4)	No
landusage	plothhd	Distance to HH (metres)	decimal(7,2)	No
landusage	plotnotes	Notes	varchar(20)	No
landusage	plotown	Land ownership	int(4)	No
landusage	plot_id	Description of plot_id	int(3)	Yes
livestock	HH_ID	household id	varchar(28)	Yes
livestock	liveafemales	Adult females	int(5)	No
livestock	liveamales	Adult males	int(5)	No

livestock	livegender	Gender ownership	int(4)	No
livestock	liveid	Livestock	int(4)	No
livestock	livenotes	Notes	varchar(30)	No
livestock	livenum	Total number of animals	int(5)	No
livestock	liveyfemales	Young females	int(5)	No
livestock	liveyemales	Young males	int(5)	No
livestock	record_id	Record ID	int(3)	Yes
lkpactactoin	lkpactactoin_cod	Lookup field code	varchar(4)	Yes
lkpactactoin	lkpactactoin_des	Lookup field description	varchar(120)	No
lkpasset	asset_cod	Description of asset_cod	int(4)	Yes
lkpasset	asset_des	Description of asset_des	varchar(120)	No
lkpcountry	lkpcountry_cod	Lookup field code	int(4)	Yes
lkpcountry	lkpcountry_des	Lookup field description	varchar(120)	No
lkpcrpprdprod	lkpcrpprdprod_cod	Lookup field code	int(4)	Yes
lkpcrpprdprod	lkpcrpprdprod_des	Lookup field description	varchar(120)	No
lkpcrprsprcode	lkpcrprsprcode_cod	Lookup field code	int(4)	Yes
lkpcrprsprcode	lkpcrprsprcode_des	Lookup field description	varchar(120)	No
lkpcrpsrpgrz	lkpcrpsrpgrz_cod	Lookup field code	int(4)	Yes
lkpcrpsrpgrz	lkpcrpsrpgrz_des	Lookup field description	varchar(120)	No
lkpexpcode	lkpexpcode_cod	Lookup field code	int(4)	Yes
lkpexpcode	lkpexpcode_des	Lookup field description	varchar(120)	No
lkpfeedcode	lkpfeedcode_cod	Lookup field code	varchar(4)	Yes
lkpfeedcode	lkpfeedcode_des	Lookup field description	varchar(120)	No
lkpfeedprod	lkpfeedprod_cod	Lookup field code	varchar(4)	Yes
lkpfeedprod	lkpfeedprod_des	Lookup field description	varchar(120)	No
lkpfeedseason	lkpfeedseason_cod	Lookup field code	int(4)	Yes
lkpfeedseason	lkpfeedseason_des	Lookup field description	varchar(120)	No
lkpfeedsrc	lkpfeedsrc_cod	Lookup field code	int(4)	Yes
lkpfeedsrc	lkpfeedsrc_des	Lookup field description	varchar(120)	No
lkpgender	lkpgender_cod	Lookup field code	int(4)	Yes
lkpgender	lkpgender_des	Lookup field description	varchar(120)	No
lkphhcoffperiod	lkphhcoffperiod_cod	Lookup field code	int(4)	Yes
lkphhcoffperiod	lkphhcoffperiod_des	Lookup field description	varchar(120)	No
lkphhconprod	lkphhconprod_cod	Lookup field code	varchar(4)	Yes
lkphhconprod	lkphhconprod_des	Lookup field description	varchar(120)	No
lkphhcontime	lkphhcontime_cod	Lookup field code	int(4)	Yes
lkphhcontime	lkphhcontime_des	Lookup field description	varchar(120)	No
lkpincome	lkpincome_cod	Lookup field code	int(4)	Yes
lkpincome	lkpincome_des	Lookup field description	varchar(120)	No
lkpincperiod	lkpincperiod_cod	Lookup field code	int(4)	Yes
lkpincperiod	lkpincperiod_des	Lookup field description	varchar(120)	No
lkplandcrops	lkplandcrops_cod	Lookup field code	varchar(4)	Yes
lkplandcrops	lkplandcrops_des	Lookup field description	varchar(120)	No
lkplanguage	lkplanguage_cod	Lookup field code	int(4)	Yes
lkplanguage	lkplanguage_des	Lookup field description	varchar(120)	No
lkpliveid	lkpliveid_cod	Lookup field code	int(4)	Yes
lkpliveid	lkpliveid_des	Lookup field description	varchar(120)	No
lkplvactactoin	lkplvactactoin_cod	Lookup field code	varchar(4)	Yes

lkplvactactoin	lkplvactactoin_des	Lookup field description	vchar(120)	No
lkplvprodprd	lkplvprodprd_cod	Lookup field code	int(4)	Yes
lkplvprodprd	lkplvprodprd_des	Lookup field description	vchar(120)	No
lkpplotcrop	lkpplotcrop_cod	Lookup field code	int(4)	Yes
lkpplotcrop	lkpplotcrop_des	Lookup field description	vchar(120)	No
lkpplotown	lkpplotown_cod	Lookup field code	int(4)	Yes
lkpplotown	lkpplotown_des	Lookup field description	vchar(120)	No
lkpprodsys	lkpprodsys_cod	Lookup field code	vchar(4)	Yes
lkpprodsys	lkpprodsys_des	Lookup field description	vchar(120)	No
lkprumbreed	lkprumbreed_cod	Lookup field code	int(4)	Yes
lkprumbreed	lkprumbreed_des	Lookup field description	vchar(120)	No
lkprumcat	lkprumcat_cod	Lookup field code	int(4)	Yes
lkprumcat	lkprumcat_des	Lookup field description	vchar(120)	No
lvstact	HH_ID	household id	vchar(28)	Yes
lvstact	lvactactoin	Activity / input	vchar(4)	No
lvstact	lvactdmnt	Male frequency (days / month)	decimal(7,2)	No
lvstact	lvactdmntf	Female frequency (days / month)	decimal(7,2)	No
lvstact	lvactdmnth	Hired frequency (day / month)	decimal(7,2)	No
lvstact	lvacthday	Male time (hours / day)	decimal(7,2)	No
lvstact	lvacthdayf	Female time (hours / day)	decimal(7,2)	No
lvstact	lvacthdayh	Hired time (hours / day)	decimal(7,2)	No
lvstact	lvacthl	Hired labour (No. people)	int(5)	No
lvstact	lvactid	Livestock / livestock category	vchar(20)	No
lvstact	lvactnotes	Notes	vchar(30)	No
lvstact	lvactothcosts	Other costs	vchar(30)	No
lvstact	lvactownlf	Own labour (No. Females)	int(5)	No
lvstact	lvactownlm	Own labour (No. Males)	int(5)	No
lvstact	lvactprice	Cost of hired labour (Ksh / day)	decimal(7,2)	No
lvstact	lvactsea	Season	int(4)	No
lvstact	record_id	Record ID	int(3)	Yes
lvstactinputs	HH_ID	Description of HH_ID	vchar(28)	Yes
lvstactinputs	lvactactoin	Input code	vchar(4)	Yes
lvstactinputs	lvactinamnt	Input amount	decimal(7,2)	No
lvstactinputs	lvactinprice	Input price	decimal(7,2)	No
lvstactinputs	lvactnotes	Notes	vchar(30)	No
lvstactinputs	record_id	Record number	int(3)	Yes
lvstfeed	feedamt	Quantity (kg)	decimal(7,2)	No
lvstfeed	feedcode	Feed	vchar(4)	No
lvstfeed	feedliveid	Livestock / livestock category	vchar(20)	No
lvstfeed	feedmkval	Estimated market value (Ksh / kg if in-farm)	decimal(7,2)	No
lvstfeed	feednotes	Notes	vchar(30)	No
lvstfeed	feedothcost	Other costs (Ksh)	decimal(7,2)	No
lvstfeed	feedperiod	Feeding period (months)	decimal(7,2)	No
lvstfeed	feedplt	Plot (if source is in-farm)	int(2)	No
lvstfeed	feedppaid	Price paid (Ksh / kg if purchased)	decimal(7,2)	No
lvstfeed	feedprod	Feed product (if source is on-	vchar(4)	No


		farm)		
lvstfeed	feedseason	Season	int(4)	No
lvstfeed	feedsplt	Subplot (if source is in-farm)	int(2)	No
lvstfeed	feedsrc	Feed source	int(4)	No
lvstfeed	feedweek	How often in a week (days / week)	int(5)	No
lvstfeed	HH_ID	household id	varchar(28)	Yes
lvstfeed	record_id	Record ID	int(3)	Yes
lvstprods	HH_ID	household id	varchar(28)	Yes
lvstprods	lvprodhc	Consumption (kg)	decimal(7,2)	No
lvstprods	lvprodid	Livestock / livestock category	varchar(20)	No
lvstprods	lvprodnotes	Notes	varchar(30)	No
lvstprods	lvprodot	Other (kg)	decimal(7,2)	No
lvstprods	lvprodprd	Product	int(4)	No
lvstprods	lvprodpri	Sale price (Ksh / kg)	decimal(7,2)	No
lvstprods	lvprodprod	Production (kg)	decimal(7,2)	No
lvstprods	lvprodsale	Sales (kg)	decimal(7,2)	No
lvstprods	lvprodsea	Season	int(4)	No
lvstprods	lvprodwho	Who controls the income	int(4)	No
lvstprods	record_id	Record ID	int(3)	Yes
mainsurveyinfo	country	Country	int(4)	No
mainsurveyinfo	date	Date	int(8)	No
mainsurveyinfo	day	Day	int(2)	No
mainsurveyinfo	division	Division	varchar(30)	No
mainsurveyinfo	elevation	Elevation	int(6)	No
mainsurveyinfo	enumname	Numerator's name	varchar(30)	No
mainsurveyinfo	gender	Gender or household head	int(4)	No
mainsurveyinfo	hheadname	Household head	varchar(30)	No
mainsurveyinfo	HH_ID	Household id	varchar(28)	Yes
mainsurveyinfo	language	Language used in interview	int(4)	No
mainsurveyinfo	latcard	Latitude cardinal	varchar(1)	No
mainsurveyinfo	latdeg	Latitude degrees	int(3)	No
mainsurveyinfo	latmin	Latitude minutes	int(6)	No
mainsurveyinfo	location	Location	varchar(30)	No
mainsurveyinfo	longcard	Longitude cardinal	varchar(1)	No
mainsurveyinfo	longdeg	Longitude degrees	int(3)	No
mainsurveyinfo	longmin	Longitude minutes	int(6)	No
mainsurveyinfo	month	Month	int(2)	No
mainsurveyinfo	prodsys	Production system	varchar(4)	No
mainsurveyinfo	province	Province	varchar(30)	No
mainsurveyinfo	rankingnotes	Crop ranking notes	varchar(60)	No
mainsurveyinfo	resp1gen	Gender 1 <sup>st</sup> respondent	int(4)	No
mainsurveyinfo	resp1name	Name of 1 <sup>st</sup> respondent	varchar(30)	No
mainsurveyinfo	resp2gen	Gender 2 <sup>nd</sup> respondent	int(4)	No
mainsurveyinfo	resp2name	Name of 2 <sup>nd</sup> respondent	varchar(30)	No
mainsurveyinfo	state	State	varchar(30)	No
mainsurveyinfo	sublocation	Sub location	varchar(30)	No
mainsurveyinfo	supname	Supervisor name	varchar(30)	No

mainsurveyinfo	village	Village	varchar(30)	No
mainsurveyinfo	year	Year	int(4)	No
otherexpen	expamnt	Amount (Ksh / season)	decimal(9,2)	No
otherexpen	expcode	Expense	int(4)	No
otherexpen	expnotes	Notes	varchar(30)	No
otherexpen	expperiod	Period	int(4)	No
otherexpen	expsea	Season	int(4)	No
otherexpen	exptimes	Times	int(5)	No
otherexpen	HH_ID	household id	varchar(28)	Yes
otherexpen	record_id	Record ID	int(3)	Yes
otherincome	HH_ID	household id	varchar(28)	Yes
otherincome	incamnt	Amount (Ksh / season)	decimal(9,2)	No
otherincome	incgender	Gender ownership	int(4)	No
otherincome	incnotes	Notes	varchar(30)	No
otherincome	income	Income	int(4)	No
otherincome	incperiod	Period	int(4)	No
otherincome	incsea	Season	int(4)	No
otherincome	inctimes	Times	int(5)	No
otherincome	record_id	Record ID	int(3)	Yes
plotinputs	actinamount	Input amount	decimal(7,2)	No
plotinputs	actincost	Input cost	decimal(7,2)	No
plotinputs	actnotes	Notes	varchar(30)	No
plotinputs	actplot	Plot	int(2)	Yes
plotinputs	actsplot	Subplot	int(2)	Yes
plotinputs	act_id	Activity	varchar(4)	Yes
plotinputs	HH_ID	Household id	varchar(28)	Yes
plotinputs	input_id	Input code	varchar(4)	Yes
rumentext	HH_ID	household id	varchar(28)	Yes
rumentext	rumborn	Born	int(5)	No
rumentext	rumcons	Consumed	decimal(7,2)	No
rumentext	rumdead	Dead	int(5)	No
rumentext	rumgin	Gifts in	int(5)	No
rumentext	rumgout	Gifts out	int(5)	No
rumentext	ruminant_id	Ruminant ID	int(2)	Yes
rumentext	rumnotes	Notes	varchar(30)	No
rumentext	rumnumly	Total number last year	int(5)	No
rumentext	rumothers	Others	decimal(7,2)	No
rumentext	rumprch	Purchased	int(5)	No
rumentext	rumpresly	Present last year?	int(4)	No
rumentext	rumprice	Price (Ksh / animal)	decimal(7,2)	No
rumentext	rumsold	Sold	int(5)	No
rumentext	rumsoldp	Price (ksh / animal)	decimal(7,2)	No
ruminants	HH_ID	household id	varchar(28)	Yes
ruminants	rumage	Age From	int(5)	No
ruminants	rumageto	Age To	int(5)	No
ruminants	rumbreed	Breed	int(4)	No
ruminants	rumcat	Category	int(4)	No
ruminants	rumgender	Gender ownership	int(4)	No

ruminants	rumid	Ruminant ID	int(2)	Yes
ruminants	rumlact	No. Lactating	int(5)	No
ruminants	rumlactlen	Lactation length (months)	decimal(7,2)	No
ruminants	rumoffnum	Number of offsprings in a period	varchar(15)	No
ruminants	rumpreg	No. Pregnant	int(5)	No
ruminants	rumsex	Sex	int(4)	No
ruminants	rumspe	Species	int(4)	No
ruminants	rumtnum	Total number	int(5)	No
ruminants	rumtrac	Used for traction	int(4)	No
ruminants	rumwea	Weaning age (months)	decimal(7,2)	No
ruminants	rumyldm	Milk yield min (l / day)	decimal(7,2)	No
ruminants	rumyldp	Milk yield peak (l / day)	decimal(7,2)	No

### 6.2.2 Reference to paper survey

Although the data dictionary explains every column in the database it is usually quite difficult to relate the data in a database with the paper survey. To minimize this Impact Lite provides a reference to paper survey. Each page of the printed survey indicates the table in the database where such data is stored plus the name of each column. Information on the related lookup tables is also provided. The following images are examples.



hh\_id

Site	PS	Village	HH

**CCAFS Detail Household Characterisation Survey**

The CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) is a 10-year research initiative that seeks to overcome the threats to agriculture and food security in a changing climate, exploring new ways of helping vulnerable rural communities adjust to global changes in climate.

The objective of this survey is to capture within-site variability on key livelihood indicators that could be used for a range of analysis including the modelling of impact of adaptation and mitigation strategies on livelihoods, food security and the environment. Furthermore, the collection of standard indicators across sites could derive suitable parameters for regional integrated assessments.

**The information collected is for research purposes and strictly confidential.**

Does the household consent to provide information Yes ( ), No ( )

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**mainsurveyinfo**  
General household information

Date (dd/mm/yyyy)	date
Name of household head	hheadname
Gender of household head	gender (lkpgender)
Name of respondent	resp1name
Gender of respondent	resp1gen (lkpgender)
Name of second respondent (if applicable)	resp2name
Gender of respondent (if applicable)	resp2gen (lkpgender)
<b>Geographical location (provided by the site coordinator)</b>	
Country	country (lkpcountry)
Region	province
Zone	state
District/woreda	division
Pastoral association (PA)	location
Village	village
Latitude	latcard latdeg latmin
Longitude	longcard longdeg longmin
Elevation (metres)	elevation
Production system	prodsys (lkprodsys)
Enumerator name	enumname
Supervisor name	supname
Language used in interview	language (lkplanguage)
First data entry name	
First data entry code	
Second data entry name	
Second data entry code	

hh\_id

Site	PS	Village	HH

4

**Form 4: Land allocation**

Include here all the different plots that the household has. For each plot, indicate the crops, trees, pastures or aquaculture each plot holds in different periods of time. One plot that can hold one or more crops.

Physical area (timad)	Plot	Land ownership (owned, leased, in/out)	Gender ownership (kgender)	Dit to HH (hour)	Cost/return (if lease/lease)	Usage		Notes
						Intercrop (Y/N)	Area of sub-plot (timad)	
landusage	plotarea	hh_id+plot_id	plotgender	plotown	plotcost	plotcrop	plotinter	plotnotes
landspits	plotarea	hh_id+plot_id	plotgender	plotown	plotcost	plotcrop	plotinter	plotnotes

record\_id  
1 2 3 : 1 2 3 4

## **7 Future steps**

### **7.1 Data standardization and documentation**

As soon as datasets are delivered they undergo a consistency check, a data cleaning process, and once this is finished we calculate the performance and livelihood indicators. This has been done for a number of CCAFS sites already. The datasets will be uploaded to the CCFAS site and properly documented latest by the end of 2013.

### **7.2 Production systems and farm typology**

Using a number of key indicators and variables collected we will build farm typologies for all 15 sites. The farm typologies will be used for within and across site comparisons, and for modeling studies to test interventions.

Proposed methods: Select variables, production system, household characteristics, market access etc. Then classify (e.g. cluster analysis). Create class variable(s), share for comments. Classification results will probably not be final immediately; several class variables (for production system and farm type) will allow teams to test them for their theoretical soundness and for the usefulness of the results.

The categorization into production systems done a priori will be verified because it is expected that that this definition helps to determine for which wider populations results are relevant (recommendation domains). There are various possibilities: several production systems in each site and several sites per production system.

Proposed methods: Select variables (e.g. income share from dairy, cereal share of land, off-farm income, livestock income, cropping intensity etc.); classification (e.g. cluster analysis); check geographical distribution of household classes in research grids with coordinates; if they are contiguous this might indicate a production system. When selecting variables think of how they would compare to secondary data available for determining production systems (in order to find the recommendation domains). Size of classes (production systems) depends on the scale. If only one site is considered, smaller classes could be included than if the classification is performed over all three regions (15 sites).

### **7.3 Modelling**

The IMPACTlite team gathered at the beginning of 2013 to plan a number of studies based on the datasets collected. We envisage at least 4 analysis including 3 regional comparisons of performance and livelihood status, and one across site comparison. The team will gather information on plausible scenarios of change to perform exploratory modeling studies. In consultation with the regional CCAFS programmes, the IMPACTlite team would like to explore opportunities for collaboration with local partners in the development of local scenarios of change, and on training of local scientists in the use of simple modeling techniques.

## 8 References

Herrero, M, E. González-Estrada, P.K. Thornton, C. Quiros, M.M. Waithaka, R. Ruiz, G. Hoogenboom, IMPACT: Generic household-level databases and diagnostics tools for integrated crop-livestock systems analysis. *Agricultural Systems* 92, 240-265.

Quiros, C., M.C. Rufino, M. Herrero. 2011. Developing generic tools for characterizing agricultural systems for climate and global change studies. International Livestock Research Institute, Nairobi, Kenya. Report of Activities 2011 Submitted by ILRI to the CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) 31st January 2011.

M.C. Rufino, C. Quiros, N. Teufel, S. Douxchamps, S. Silvestri, J. Mango, A.S. Moussa, M. Herrero. 2012. Household Characterization Survey – IMPACTlite Training Manual. CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS) Working document, December 2012.

## 9 Annex

### 9.1 Village locations in research grids in IGP

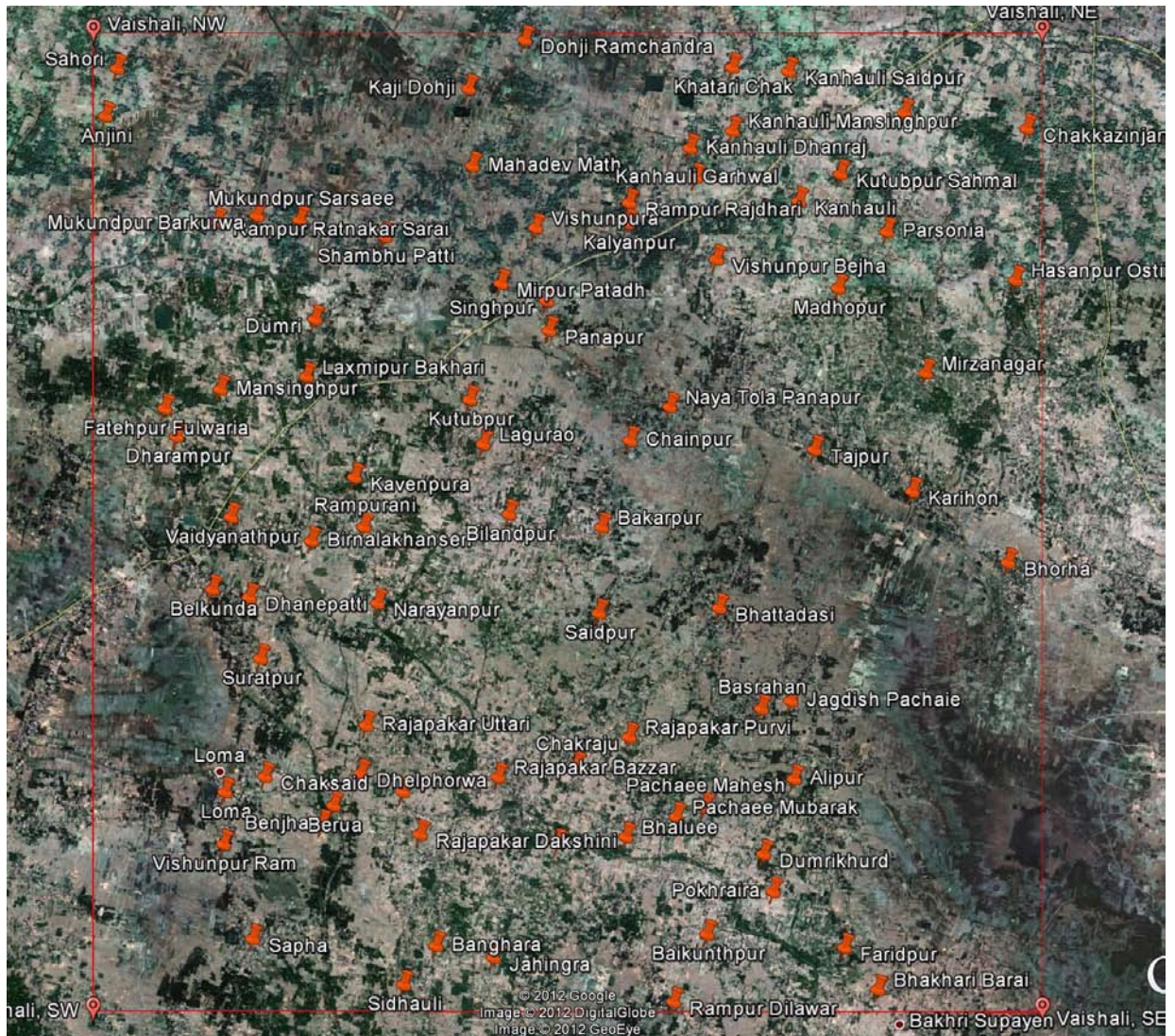


Figure 1: Vaishali research grid with village locations

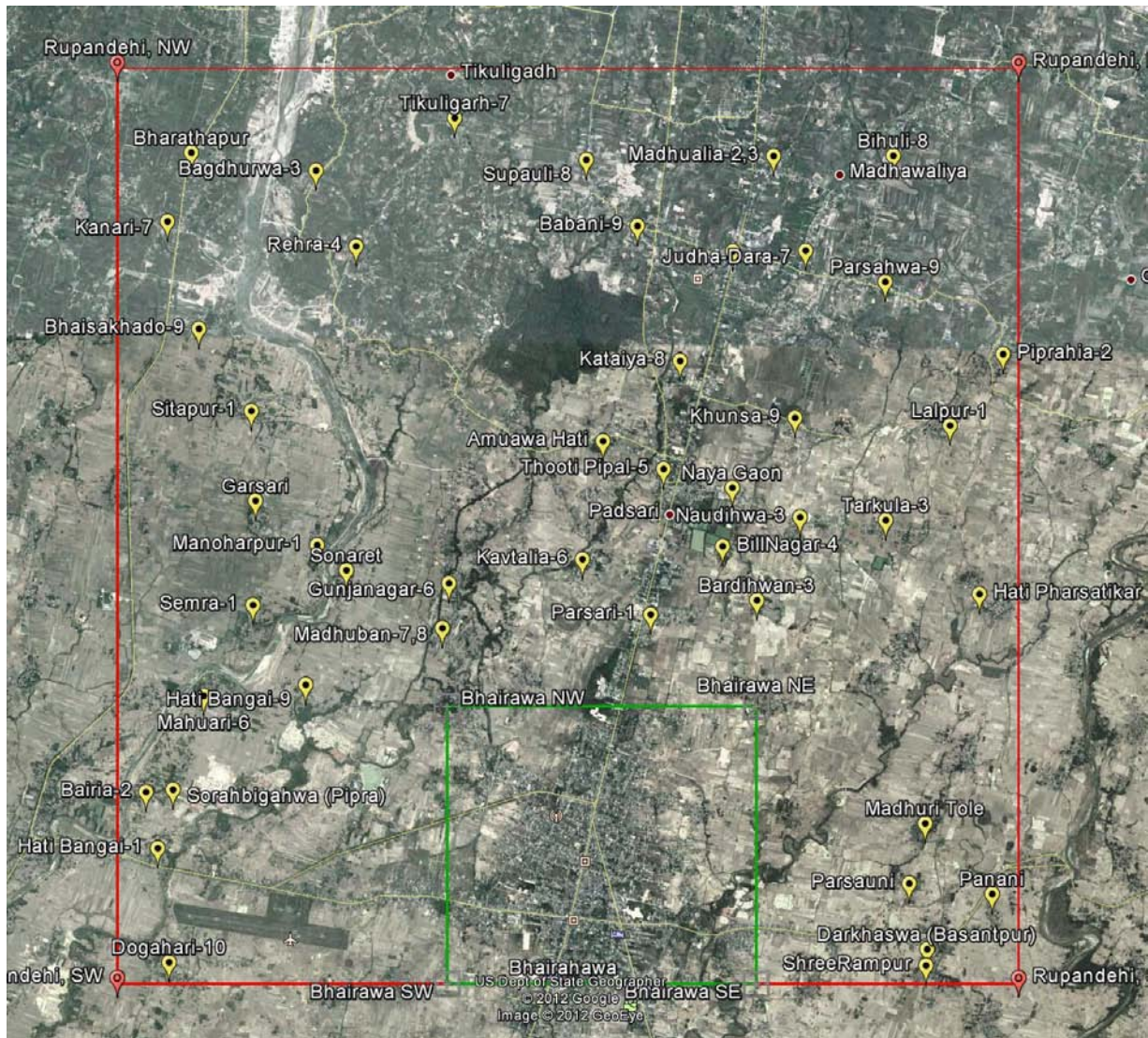


Figure 2: Rupandehi grid with village locations and exclusion zone for Bhairawa town

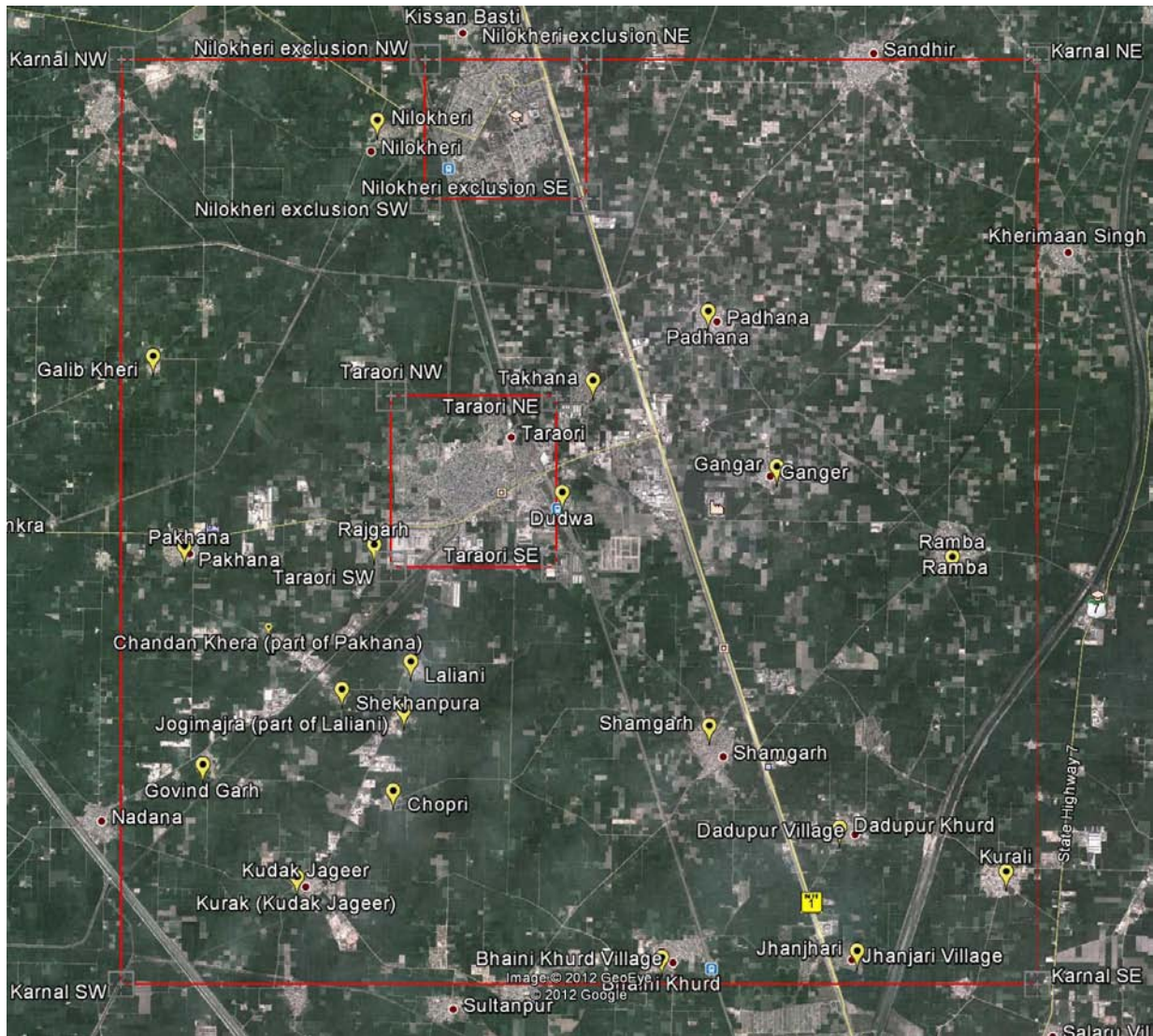
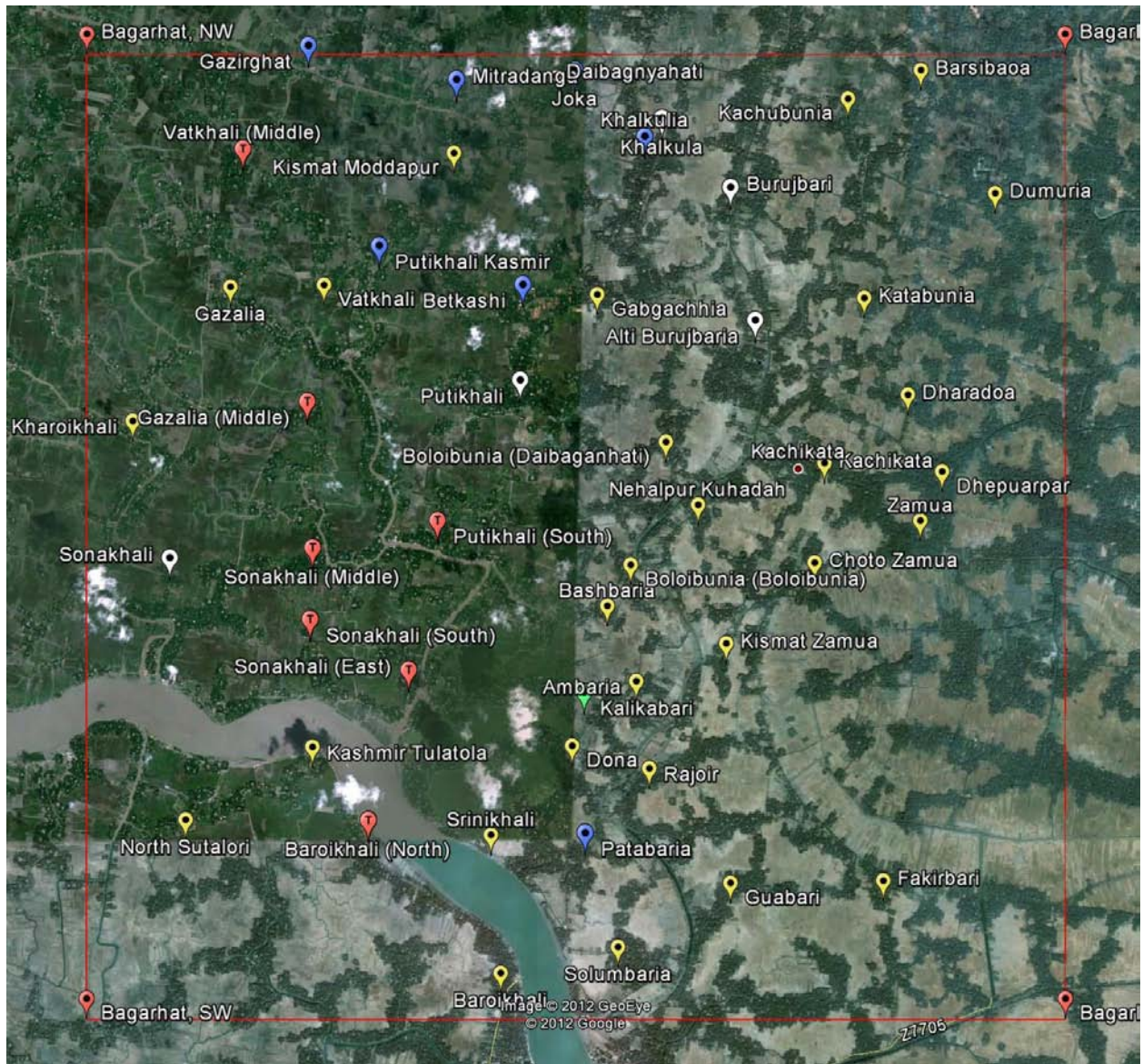


Figure 3: Karnal grid with village locations and exclusion zones for Traoria and Nilokheri towns



Note: Marker colour indicates dominant production system (paddy-yellow, aquaculture-blue, vegetables-green, mixed-white); dependent hamlets are marked red with a "T".

Figure 4: Bagerhat grid with village locations and their dominant production systems

## 9.2 Village locations in research grids in Senegal

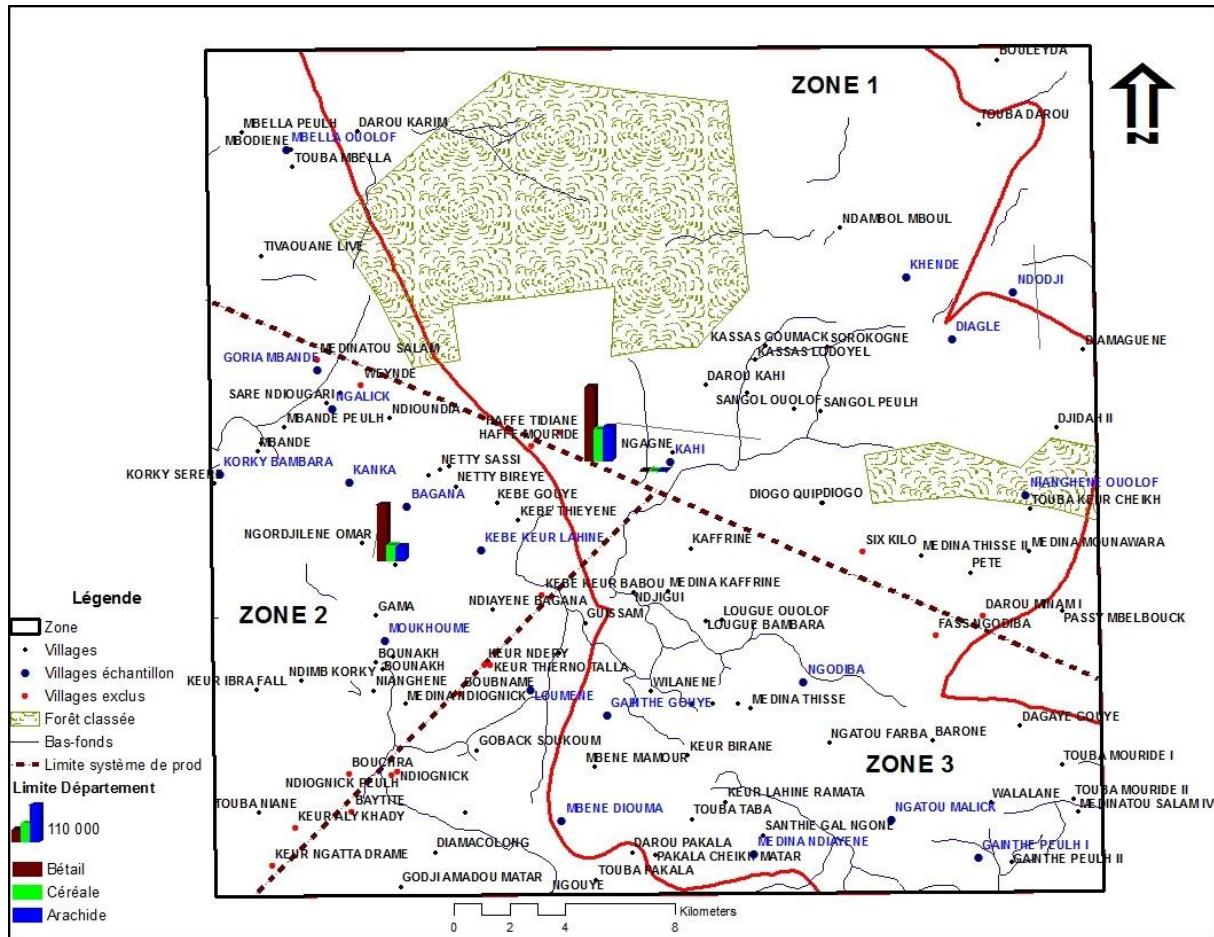


Fig. 5. Map of the production systems in Kaffrine