

Environmental Flows Assessment for the Ramganga

Socio-cultural and Livelihoods Component



Starter Document
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A. Background

A natural flow regime is ideal for the health of a river (Poff et al., 1997¹). This flow regime includes all of the water that enters the river during both low flows and floods at the appropriate seasons and for the appropriate duration. However, given the scale of human dependence on surface flows, this is no longer possible.

The compromise is to endeavour to allow atleast that flow regime in a river that is necessary for it to continue to carry out its ecological functions effectively. This does not imply a 'minimum' or 'base flow', but a series of high and low flows as per the season (King, Tharme, & Villiers, 2000)². This variation in flow is essential to aquatic vegetation, fish and aquatic animals, and to land forming.

Humans are also an important part of the environment of a river. Over the centuries, they have observed the flows and adapted their livelihoods to suit the seasonal cycles of the river. Rituals and ceremonies serve to mark the changes in these flow patterns as well as maintain connection with the river (Croll & Parkin, 1992)³. With industrialisation and a growing reliance on machinery, people are no longer entirely dependent on these flows.

Present dependence on flows is proportional to the vulnerability of the community concerned. The poorer and more marginalised the group, the fewer options it has, and the greater it's reliance on flow regimes. A prosperous farmer can afford to install a tubewell for irrigation; sharecroppers and subsistence farmers have no option but to wait for the annual inundation of their fields. This relationship is seen in nearly every livelihood practised on the river. It thus becomes necessary to make an attempt to provide marginal farmers with the flow regimes they need to continue to farm.

Religion often serves as a rallying point for communities. At present river-based livelihoods are threatened by low flows, pollution, and loss of land; rituals and religious sentiments then become the primary connection between a community and a river. If peoples' need for flows for rituals are heard and acknowledged in environmental flows management, then their support can be ensured. It has been observed that flows requirements for rituals correspond closely with the natural flow regime of a river (Lokgariwar, Chopra, Smakhtin, Bharti & O'Keeffe, 2013⁴)

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- 1 Poff, N. L., Allan, J. D., Bain, M. B., Karr, J. R., Presetegaard, K. L., Richter, B. D., Sparks, R. E., & Stromberg, J. C. (1997). The natural flow regime: A paradigm for river conservation and restoration. *BioScience*, 47(11), 769–784.
 - 2 King, J., Tharme, R., & Villiers, D. E. (2000). Environmental flow assessments for rivers: Manual for the building block methodology. Water Research Commission Report No.TT131/00.
 - 3 Croll, E., & Parkin, D. (1992). Anthropology, the environment and development. In E. Croll & D. Parkin (Eds.), *Bush base: Forest farm* (pp. 3–10). London: Routledge.
 - 4 Chicu Lokgariwar, Ravi Chopra, Vladimir Smakhtin, Luna Bharati & Jay O'Keeffe , Water International (2013): Including cultural water requirements in environmental flow assessment: an example from the upper Ganga River, India, Water International, DOI:10.1080/02508060.2013.863684

It is crucial then, from both an environmental and a humanitarian point of view to include the flows requirements of riparian communities in environmental flows assessment.

Such an assessment of socio-cultural flow requirements has been carried out along the Ramganga as part of Rivers for Life Programme of WWF-India. The present document presents the findings from this work done in 2014.

B. Methodology

The objective of the research was to assess the socio-cultural aspect of the environmental flows for Ramganga River. The socio-cultural flows can be taken to mean as those flows that satisfy the following requirements of the people living along the river:

- **Religious:** Flows needed to carry out rituals, satisfy expectations recorded in mythology and folklore (such as 'blessing' a particular village)
- **Livelihoods:** Flows needed to satisfy traditional livelihoods practised along the banks (such as *Paalage* farming and fishing) that *depend on instream flows* (Chap 9, King and Tharme). This will necessarily exclude large industrial practices, irrigation and other works that rely on a modification of the river, and practices that depend indirectly on the river such as groundwater use. While it may seem desirable to include aquifer recharge as a social function of a river, especially in the context of the heavy groundwater use in the plain areas, the truth is that baseflow interaction is an extremely complex issue, and one to which we cannot do justice in the current exercise (Hughes, Smakhtin 2001).
- **Historical flows:** These form the basis for both folklore and peoples expectations of what the river should be like. These expectations are part of our social fabric and so need to be considered.

The goals of this study include both qualitative and quantitative parameters. Reference, current thresholds of concern, and desired flows are the flow parameters that need to be quantified. The justification for each of these are necessarily qualitative. Similarly, descriptions of the livelihood and religious practices are needed along with some quantification of the numbers involved. Myth can be defined as 'subjective truth of community'; it is what defines a people and created the history that they relate to⁵.

Keeping in mind the complex nature of the study a multi method approach was used. The surveys hinge on two crucial aspects:

I. Interviews: In-depth interviews (In-Depth Interview, Chapter 4, p.119-124, The Practice of Qualitative Research, Sharlene Nagy Hesse- Biber and Patricia Leavy, Sage Publications 2006) are to be carried out at each cross-section. A minimum number of 70 interviews at each site were aimed for, with a balanced mix in terms of gender, religion, and activity. For this reason, purposive sampling was used to select respondents from within these categories. Purposive

5 Devdutt Patnai, ADD REFERENCE

sampling selects people on the basis of the particular purpose of the experiment; Selection of the sample is based on the judgement of the researcher. (The Research Process, Chapter 2, p.61, The Practice of Qualitative Research, Sharlene Nagy Hesse- Biber and Patricia Leavy, Sage Publications 2006). A questionnaire was developed and first used at Chaubari. This was then refined before a final format was created.

The interviews follow the following approach:

- Introduction of the purpose of the survey
- Explanation of the questionnaire
- Interview as per the format
- Discussions regarding history of the site, any additional anecdotes etc.

II. Focus Group Discussions: FGDs were conducted to have discussions within smaller specific groups of people involved in specific activities associated with the river like fishing, sand mining etc. The research team got useful information on varieties of fish, changes in livelihood over the years with changes in flow. Groups of women gave interesting insights into cultural activities, rituals that they perform at river banks and songs related to the river. (Focus Group Interviews. Chapter 6. p 195-196. The Practice of Qualitative Research, Sharlene Nagy Hesse- Biber and Patricia Leavy, Sage Publications 2006)

III. Participatory rural appraisal (PRA):

The interviews provide adequate information on individual experiences such as nature of livelihood, rituals, expectations, and history. The drawback is that we do not have a means of triangulating responses to check accuracy. (p13, Introduction, Chapter 1. 80 Tools for Participatory Development: appraisal, planning, follow-up and evaluation. Geilfus Frans. Inter American Institute for Cooperation on Agriculture (IICA).2008) Information related to income also tends to be non-anonymous and so often withheld. PRAs were conducted with a thought to overcome these shortcomings.

PRA objectives:

- To quantify the extent and production of livelihoods dependent on river flows.
- To determine the interaction of rituals and livelihoods with the river.
- To determine historical flows and river events such as floods, changes in bed etc

Techniques used: A combination of following techniques was employed while conduction PRA in various villages along banks of 5 sections on the river.

- **Transect walk and diagramming:** conducted with an initial group from within the village to get an idea of river's distance from the habitation, farms, observe community's activities associated with river; to later illustrate the features in a diagram and use as starting point of discussion (p65, Participatory Appraisal: Natural Resource Management, Chapter 4,)

- **Resource mapping of the area:** with a focus to understand the extent of the river, farms, fishing spots, and places where rituals are performed. (p63)
- **Timeline:** Involvement of people from various age groups to record important events in the village, the river and any changes in village-river interaction. (in Kamedua, for example, everyone remembers 2 major floods that changed the farming land, and the time when the river shifted its bed). (p53)
- **Seasonal calendar:** Livelihood and cultural activities as they vary through the year with changing flows (summer low flows, floods, monsoon, winter flows). (p 59, General Community Issues/ Social Issues, Chapter 3.)
- **Daily calendar:** To record variations in activities within the day associated with the river (for eg women go for worshipping early morning at the banks, livestock for fodder and water is taken during the day mostly by men etc.)
- **Time Trend:** Depicting the changes in the river flows over the years and consequential changes or impacts on associated activities. This helped understand the variation in farm production with the changes in the river; variation in fish catch; changes in flows before and after introduction of barrages in the river; outmigration from the village etc. (p55. General Community Issues/ Social Issues, Chapter 3. 80 Tools for Participatory Development: appraisal, planning, follow-up and evaluation. Geilfus Frans. Inter American Institute for Cooperation on Agriculture (IICA).2008)

The PRA exercise overall yielded important information about historic flows and justification, desired flows and justification and river-related livelihoods and dependence on these. It also ensured involvement of community in the research process. Much detailed understanding of the social fabric of the villages at each site and their association with the river could have been observed had the team been able to reside at the section for extended periods of time, ideally over an entire year. However, given the nature of the study as well as its time frame, it was not possible to conduct the research this way.

C. Work Done

The team started with participating in the first workshop and field visits along Ramganga River during the month of January. This was to select cross sections along the river keeping in mind various study disciplines – geomorphology, socio-cultural aspect, and aquatic and terrestrial biodiversity depending on river. We started brainstorming on methodology for the project and draft questionnaire in the months of March and April.

Study Team

Dr Anil Gautam led the research project assessing environmental flow requirements of the Ramganga. Chicu Lokgariwar was the senior researcher. The research team comprised of Bhuwan Joshi, Neha Khandekar and Ravinder Thakur. Ajay Joshi facilitated the PRA activities and trained the research team on PRA process. Dr. Ravi Chopra and Debashish Sen advised the

research team.

Cross Section Surveys

The team participated in cross section surveys with members from other institutions during the month of May. The idea was to get hold of the cross section sites and broadly observe them with perspective of livelihood dependency and culture (temples, cremation sites etc.). Surveys to determine the cross-section at each of the selected sites were organised on the following dates:

13 May to 20 May 2014: 4 sites in the upper Ramganga [Bhikiyasain, Marchula, D/S of Kalagarh dam, D/S of Harewali Barrage]

26 May to 1 June 2014: 4 sites in the middle and lower Ramganga [Agwanpur, Katghar, D/S of Kosi confluence, Dabri]

Atleast one member of the PSI team was present for each survey. During this time, along with confirming the extent of the cross section, a reconnaissance survey was done at each site. Informal interviews of people at and near the section were carried out to obtain a picture of the key issues at each section, main users, peoples' interaction with the river, likely villages for surveys etc

The following activities were carried out at each site:

1. Bhikiyasain

- Observing cross section site and identifying locations of temple(s), cremation sites on river bank for carrying out FGDs and interviews in next round of surveys.
- Identifying local fish markets for livelihood dependency survey in Bhikiyasain market, interaction with locals at temple to understand mythological reference and importance of river Ramganga and association of people living on its' banks.

2. Marchula

- Observing cross section sites, identifying local temples;
- Discussion with Mr Anil Kumar from Banghat organization to understand the socio-cultural importance of river at the site and association of people, livelihood dependency etc.

3. Afzalgarh

- Discussion with temple priest at Kalagarh Ramganga Mandir
- Locating settlements near river bank.
- Observing cremation site and discussion with locals there.
- Visited Gurudwara Ghat and discussion with the care taker Sukhdev Singh Ji.
- Visited Afzalgarh fish market near Kadrabad and had a discussion with local fishermen .

4. Harewalli Barrage

- Discussion with fishermen in local settlements along the river banks about their livelihood dependency and seasonal variation in fish catch
- Discussion with local farmer about flood plain farming

5. Agwanpur

- Observing cremation site and discussion with local fishermen

6. Katghar Bridge

- discussion with CWC gauge officers, temple priest,
- visit to local fish market and discussion with fishermen
- Discussion with temple priest regarding mythological significance of river Ramganga, influence of Kalagarh dam of seasonal flows in river, religious Mela Ganga Dusshera and encroachment on river banks.

7. Chaubari

- Discussions with farmers, fishermen, priests and shopkeepers. Indepth interviews.

8. Dabri

- Discussions with farmers and fishermen.

Field Surveys

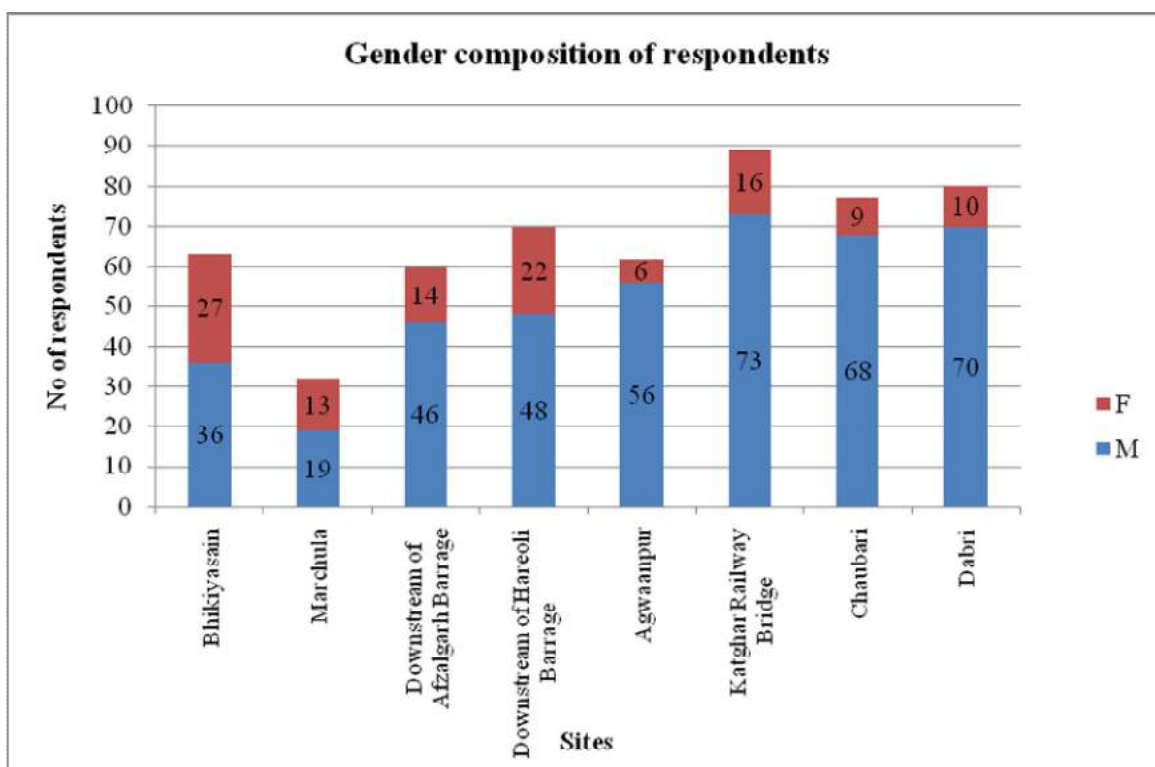
Field surveys began as per schedule in June. These were conducted with a small team of 2-4 people. Prior to the survey, any contacts made during the cross-section surveys were telephoned. Their opinion on an appropriate date for the surveys was sought. This helped gather support and maintain interest, especially in those sections where a PRA was to be carried out later.

At the section, each survey began with a reconnaissance of the area by the team. After this, individual interviews and group discussions were conducted. The exercises were usually carried out over 2-4 days. Any functions or rituals carried out at the section were also observed, and if possible, documented.

S.No	Section	Dates	Team's Observations
1	Bhikiyasain	10 and 11 June	Several villages that regularly access the river at the section, along with the town of Bhikiyasain itself. Farming, fishing, and rituals. There is some tension due to the sand mining which increases damage due to floods.
2.	Marchula	12 and 13 june	Thinly populated. Some forest villages and resorts that access the river. Angling, tourism, and domestic use during scarcity. Some alienation due to the forest.
3.	Afzalgarh	14 and 15 June	One of the most challenging sites. Most people have settled here only a generation ago, and so do not have extensive memories of the river prior to the dam, which dominates floods. Questions regarding high flows invariably bring up references to the Kalagarh emergency release, which leads to skewed responses. A PRA is expected to provide more insights.
4.	Chaubari	07 and 08 June	Extensive use of the river-bank and flows. Most users are almost entirely dependent on river flows. There is great distress at the moment among these users due to the barrage.
5.	Katghar	22-24 July	Conflicts are dominant in all discourse at this site. Conflict occurs over divides in religion, livelihood, caste, legal status and more. The Ramganga, ironically, is a leveller with nearly all respondents owning affinity with the river.
6.	Dabri	3-5 July	This is a predominantly agricultural section, with all respondents engaged directly or indirectly in farming. Both hindus(of several castes) and muslims are engaged with the river. Here, as in Kalagarh, the river flows are dominated by the dam releases.
7.	Harewalli	6-8 Oct	Downstream of the second barrage in the river, women of this site gave interesting perspective on Ramganga being reffered as 'younger ganga'(<i>choti Ganga</i>) and 'unmarried' i.e. river that keeps changing course. People engage in farming of crops like sugarcane, wheat and rice – which is affected by storage and release of flows by the barrage.

8.	Agwanpur	10-12 Oct	This site had good coverage of respondents from Muslim community. Various livelihoods associated with river were recorded. Responses were obtained from farmers, shopkeepers, timber merchants, fisherfolk and householders. Detailed information about the various trades associated with the river, including fishing, vegetable farming, raising tree nurseries, and timber was obtained.
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Following graphs show gender composition and religion wise breakup of respondents across the sites



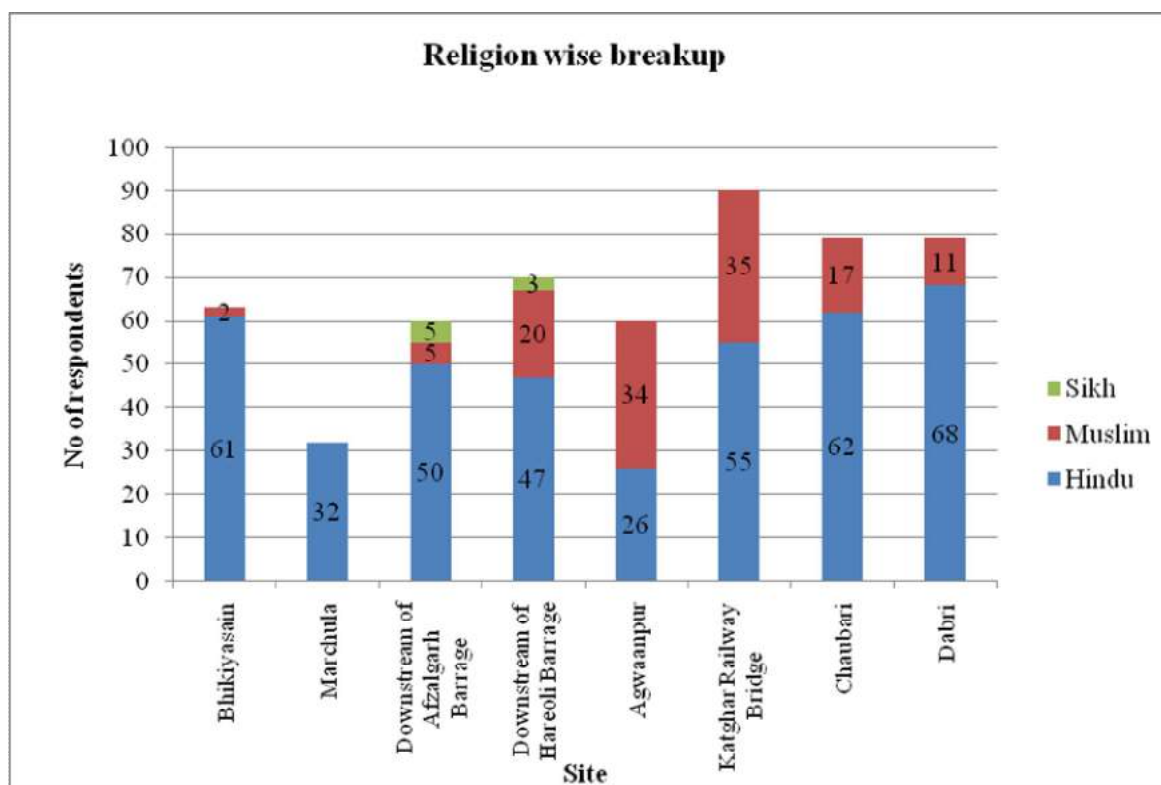
Participatory Rural Appraisal

A PRA was conducted in the first week of July at Bhikiyasain. The following tools were used: time line, time trend, transect walk, resource mapping, social mapping, and seasonal mapping. One male and one female member of each household in Kamedua, on the right bank of the river, about 200 metres downstream of the section, participated in the PRA. This yielded important information about the following:

1. Historic flows and justification
2. Desired flows and justification
3. River-related livelihoods and dependence on these

Following the PRA conducted at Bhikiyasain, the exercise was carried out at remaining sites in October and November. Detailed PRA reports are provided in Annexure. The villages in which these PRAs were conducted are as follows:

Section	Dates	PRA sites	Team's observations
Bhikiyasain	28 June-2July	Kamedua village	Along the bank of the river. Practice farming, fishing and religious rituals.



Harewali	9-10 Oct	Parmawala village	This village is among the two that are most immediately downstream of the Harewali barrage. This has both Hindu and Muslim residents, as well as several farmers.
Afzalgarh	31 Oct-2Nov	Kunwa Khera village	Settled by Sikhs, this village is on the river banks. The people are engaged in farming and sandmining. Some fishing is also carried out.
Katgarh	28-30 Oct	Barbalan settlement	This <i>basti</i> is closest to the cross-section. Several livelihoods are intimately associated with the river.
Dabri	26-28 Oct	Mau Shahajahanpur village	During the surveys, this village was noted for the connections that the residents have to the river.

Analysis of Present, Desired and Reference flows

The responses obtained during the PRA and the surveys were analysed to determine flow levels for the flows setting workshop.

The team worked on preparing a starter document during the months of January and February. This is a compilation and presentation of work done so far in the form of flow analysis notes for each of the site along with PRA reports and flow analysis. It also explains the methodology used for carrying out the research.

Activity	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15
Development of methodology													
Development of survey-questionnaire													
Cross Section Surveys													
Surveys, PRAs													
Survey Transcription													
PRA Reports													
Submission of QPR 1													
Submission of QPR 2													
Submission of QPR 3													
Present, Desired, Reference Flows													
Starter Document													
E - Flows Setting workshop													

D. Analysis of Survey results

According to the Manas Khand (Atkinson, E.T. The Himalayan Gazetteer. First published 1884 as 'The Himalayan Districts of the North West Province of India' reprinted 2014. Natraj publications) the Ramganga possesses 'the seventh part of the virtues of the ganga; its sands are golden and in it are many fish and tortoises'. Alternative names attributed to it are 'Rathabahini', 'Suvarna', and 'Saravati'. The surveys also brought out several such stories about individual sections.



(Origin of River Ramganga – Ramnali, Gairsain)

The survey team tried to record a rich diversity of livelihoods, rituals, and other ways in which different groups of people relate to the river. While documenting responses, every attempt was made to capture the experiences and desires of the many different groups that interact with the river. The team focused on livelihoods and rituals that were endemic to the Ramganga, and those that are endangered. The flow requirements of livelihoods and cultural processes that depend on flow regimes were recorded.

1. Analysis of survey results for Bhikiyasain

Bhikiyasain is the first section on the Ramganga as we proceed from the origin to the confluence. The site is at a CWC measuring station near a small town of the same name. The river here, about 40 kilometers from its origin is relatively clean, and without obstructions to its flow. The Gagas meets the Ramganga here, and the Nauleshwar temple at the confluence is well known.

◦ Work done:

Interviews were carried out at the Bhikiyasain cross-section between 11th and 15th June. Sixty-five interviews were carried out in the neighbouring areas Bhikiyasain market, Kamedua, Jainal, Badikot, Sera, Malla Subauli and Talla Subauli. In the first week of July, a participatory resource appraisal was also carried out in Kamedua, the village closest to the river.

◦ Geography:

Bhikiyasain is located a 40 kilometers below the source of the Ramganga at Ram Nali. It is

also here where the Gagas meets the river, along with the Naurad. This confluence of three rivers, a Triveni, is reported as being a main contributor to the perceived cultural significance of the site.

- **Historical/mythological importance:**

As mentioned earlier, the 'Triveni Sangam' vastly adds to the importance of the site. There is a regular mela held at the confluence for Shivratri. Besides this, the area has several links to Shiva. Shiva himself is said to have visited the river. Atleast four respondents reported that because of the confluence, the river here has the same importance as the Ganga at Haridwar. The Shiva temple at the confluence is reputed to be of miraculous origin.



Once a cowherd noticed that his cow would disappear all day, and would return in the evenings, completely dry of milk. Convinced that someone was milking his cow he followed her one day. When he did, he saw her go to a thicket and stand there while milk flowed copiously from her. Curious, he investigated the thicket and found a shivling. People began to visit the miraculous shivling and a temple was then built there. The people of Subauli claim to have built the temple, but this is contested by the members of other villages, and is a source of some mild resentment.

An even greater source of dispute is the settlement of the hamlet of Kamedua. The people of Subauli claim to have appointed a Goswami as the caretaker of the temple and donated some land to him and his family. This land is now the hamlet of Kamedua. This theory is rejected by the people of Kamedua who asked during the PRA, 'Who are the people of Subauli that they can bring our ancestors here?' Their claim is that Kamedua was settled by their ancestors who always had a great affinity for water. They enjoyed bathing and fishing. The people of Kamedua also

claim to be direct descendants of the Ganas, Shiva's army, and so have a natural right on the proceeds of a Shiva temple.

If the monsoon is late, the women of the villages around Bhikiyasain take part in an unique function. After a Yagna, they carry water from the river up to the Shiva temple and pour it on the Shivling. There is a passage by which this water flows back downhill towards the Ramganga. The process of pouring water on to the Shivling is continued till the water flows in a continuous stream from the temple to the river. If the water reaches the river, it is understood that the rains will arrive soon.

Present perceived status:

- **Mining a major source of dissatisfaction.**
- **Decrease in flows from historical levels attributed largely to pumping stations**
- **Intensity of floods also a point of concern**

A majority of the respondents are not satisfied with the river as it is now. Only seven respondents- or 10% of the total number- report being satisfied with the present condition of the Ramganga at Bhikiyasain. Even within these, two of the respondents chose to qualify their acceptance, with one saying that he only likes it at certain times of the year, and the other stating that he is satisfied with the river, but the mining should stop.



Quality and quantity are both represented in the concerns of the people of Bhikiyasain and the surrounding areas. Added to this is the concern over unstable banks.

Nearly all respondents mentioned a decrease in flow levels. Only one respondent suggested an increase in winter flow levels over the last decade; other than this people are unanimous that water levels have decreased. Simultaneously, they are traumatised by the recent floods, one of which witnessed the death of a young woman. Several respondents described an increase in the intensity of floods, which they attributed to the changes in the riverbed due to the removal of boulders. Responses indicate that the extent of floods has not changed much.

Several respondents date the decrease in flow levels from the installation of pumps to withdraw water. At least 6 respondents, while expressing dissatisfaction over the reduction of flows, also saw it as a sign of the river's greatness and benevolence. One respondent, while talking about the

special characteristics of the river, said 'Ramganga gives water to 500 villages from here'. These respondents also expressed a desire for pre-pumping flow levels, i.e. The levels before the pumps were installed. .

Increasing population and the resultant pollution is another cause of concern. According to one respondent, pollution has increased with the migration of 'nearly a thousand officers' to Bhikiyasain. Several others complained of untreated sewage from bhikiyasain being let out directly into the Gagas and so into the Ramganga. Atleast one respondent acknowledged being too squeamish to bathe in the river any more. Open defecation was also mentioned by a couple of respondents, though the main cause of worry remained the waste from the town of Bhikiyasain.

The people of Kamedua and the Bhikiyasain market both expressed concern about the increasing intensity of floods.

According to them, the river has now shifted its position such that it cuts into the fields. This has made the banks unstable. Nearly all the local respondents mentioned sandmining and its effect on the stability of the river. Of the various groups, the people of Kamedua feel most vulnerable. As a respondent put it, ' We are stuck between the gadhera, the mountain and the Ramganga.'



◦ **Livelihoods:** The area around the Bhikiyasain site is peri-urban in its outlook. While 42 respondents still listed agriculture as their profession, they do not depend entirely on it for their livelihood. Nearly all families have one or more members in urban areas and depend on the income sent by them. There is an increasing trend of the wage earner shifting entirely to the city along with his/her dependents. In Kamedua, there were only two families, that did not have a family member working outside the village. Even these two were people who had returned for various reasons from working in the city. Also, while no local families depend entirely on fishing, it forms a major supplement to peoples food. Sandmining – including the removal of boulders and pebbles- is the major organised livelihood activity with the river. A respondent said that the Gram Panchayat issues tenders for the mining and that most of the people who engage in this are not locals, but from 'outside'.

- **Agriculture:** According to the residents of Subauli, earlier each village had fields near the river. In recent years, the fields have been washed away. Farther away from the river, the agriculture is primarily rainfed. If there is any irrigation, it is from a gadhera rather than from the river. The only link that agriculture as practised here seems to have with the river is at the time of floods. Floods both wash away the fields and also bring in new soil. One respondent pointed out that where the spread of the river is more, the floods do less damage; it is when the river is forced into a narrow channel, often close to the bank, that damage is caused.

Agriculture has decreased to a considerable extent in the last few years. Earlier every family used to have extensive fields both near the village and near the river. Millets, rice, wheat, vegetables and corn were cultivated. These days, while most families still do a certain amount of cultivation, it does not meet their food needs. Families which have migrated entirely do not even do this rudimentary tilling.

Reason for inclusion: Agriculture forms a part not only of the livelihood of the communities that live by the river, but also a part of the social fabric. Agriculture is an important part of how the villagers see themselves. This is illustrated by their keeping up at least some token farming even when it is not viable. Despite the lack of irrigation, agriculture is linked to river flows as these flows determine whether the fields are accessible or not. In other sites, the river flows also provide soil moisture by inundation during the floods, and seepage in other parts of the season. However, at no point have the villages used water directly from the Ramganga for irrigation

- **Fishing:** This is an important part of life along the river at Bhikiyasain. Most families fish, largely for their own consumption. According to the discussion during the PRA at Kamedua, this occasional fishing leads to the use of some 20,000 rupees worth of fish annually per family. The local families fish using a line or casting a net. Considerable damage is caused by commercial fishermen who use exploitative methods of fishing such as the use of electricity or bombing. The people interviewed were eager to distance themselves from this type of unsustainable fishing. A respondent at Kamedua told us that they prevent the use of electricity along the river stretch that is part of their village whenever they can. However, the Himalayan Gazetteer explicitly describes the use of exploitative methods of fishing at this particular section of the Ramganga.

Most fishing is done in the summer months. At this time, the flow is both gentle and shallow. The water is also warm and it is pleasant to fish. Another consideration is that the summer holidays see the arrival of visitors. Fishing -and serving the catch- is a popular activity. Fishing is continued in the monsoon too, but stops once the flow is perceived to be dangerous. In winter, it is too cold to enter the water, and fishing comes to a standstill.

Dahau, the fishing festival is held just before the monsoon, when the water level is at its lowest. Fishing is generally done by casting a net. This is the time when villagers who live on the mountain slopes, away from the river, are also allowed to fish to their heart's content. This once was their only access to fish, but now it is considered to be more of a social occasion. Several respondents informed us that the practice of this mela has decreased in recent years.

Reason for inclusion: Like agriculture, fishing forms a part not only of the livelihood of the communities that live by the river, but also a part of the social fabric. One of the respondents during the PRA, who now works in Delhi, spoke of fishing whenever he visited 'to feel back at home'. Though the respondents did not look at it as an income generating measure, it contributes largely to their food budget. Dahau is also indulged in as a ritual, a part of what it means to live in the area. Commercial fishing is undoubtedly harmful, but largely done by outsiders and frowned upon by the residents.

- **Sandmining:**



- This is practised by the locals to collect material for their own homes. At this level of use, it is probably not too damaging. At the section, however, sandmining is a large-scale activity practised largely by outside contractors. The practice causes disruptions in the riverbed and at least at Kamedua has caused the river to shift its course from the right bank to near the village fields. Course-shifting is a natural phenomenon, but the residents of Kamedua allege that the river had never come so close to the village before sandmining began.

Sandmining is practised during all periods excluding floods when access to the river is limited. However, explicit flow requirements for sandmining have not been considered.

- **Rituals:** The river at Bhikiyasain is culturally important due to it's being a confluence of three rivers 'Triveni' and due to the presence of the Nauleshwar temple. A cremation ghat also is located at the confluence. Religious rituals associated with the river include cremation, bathing, and immersion of idols. Idols from the surrounding temples are also brought here to be bathed.

As described earlier, the women who live near the river have a ritual of bathing the shiva idol

with water from the river till the runoff meets the river again to bring rain. In addition, there is also a custom of pacifying the restless spirits of ancestors by bringing them down – symbolically- to the river to bathe.

Bathing of idols and ancestors requires enough water for them to be immersed completely. The presence of occasional deep pools in the river enables this activity even when flows are otherwise low.

Swimming is a popular activity among the youth. For this it is necessary that the water be in a smooth and broad channel, and atleast waistdeep.

Similarly, fishing is not just a source of food, but a much-loved ritual. The act of fishing seems to be what connects people to the area. While most fishing is done in the summer, when the river is both gentle and warm, it is understood that the flows that are required for a healthy fish population are also important for this practice.

- **Historical flows**

Respondents were asked to describe the flows as they recalled them two decades ago. This predates the large-scale pumping withdrawal (for water supply to the neighbouring villages) which is the major intervention in the river at present. Nearly all the respondents reported a decrease in flows. This was often linked to the decrease in rainfall.

- **Summer:** All respondents mentioned a visible decrease in the flow since the pumps were installed. Two respondents explicitly mentioned a 50% decrease in the flow while one mentioned a 30% decrease.

- **Width:** Both sandmining and a decrease in the water have contributed to a narrow channel. Earlier, the channel was broad and touched the mountain (the right bank) in summer. One respondent described the river as being 150-200 metres wide.

- **Depth:** Again, the depth is said to have decreased. It is only one respondent who alluding to the sandmining stated that now the river flows in a narrow and deep channel as against the earlier broad and shallow flow. Most other respondents agreed that the depth has reduced. A large number of the respondents mentioned waterlevels between two-four feet, or between the knees and the waist. In addition, there were deeper pools between 5-10 feet. One respondent reported the necessity of using 'tumbad' to cross the river safely even in summer before the bridge was built.

- **Velocity:** The river usually had a gentle flow in a broad and stable channel in the summer, and this was partly the reason for the popularity of fishing in this season. With the increase in sandmining though, the bed has become more uneven, and the water is channelized into narrow and fast beds.

- **Monsoon:** All respondents asserted that the water filled the entire river bed during the monsoon, and extended across the floodplain during floods.

- *Width*: The river extended across the river bed and touched the embankments on the left bank, just upstream of the bridge. Some respondents also described it as being 2-3 metres wider than present, which tallies with the former description
- *Depth*: People were unanimous in offering that the water was far deeper than their height. Estimates of depth were generally between 4 to 9 metres. Some respondents also said that the water reached the top of the embankments, which means a height of nearly 3metres at the edge with corresponding depth at the centre.
- *Velocity*: Respondents did not specify a change in the velocity between now and past monsoons.
 - *Winter*: Broadly speaking, the historical flows in winter were about 2-3 times the current winter flows. One respondent mentioned that it would cover about 60% of the floodplains before the embankments were constructed.
- *Width*: The river extended across the river bed and reached the top of the embankments on the left bank, just upstream of the bridge.
- *Depth*: Respondents stated that the water was too deep to cross easily, with flows being twice that of the summer. Depths mentioned ranged from 2 feet at the edges to 7 feet at the centre, with pools upto 12 feet depth.
- *Velocity*: Respondents did not specify a change in the velocity between now and past winters, however it was largely gentle enough to permit crossing before the bridge was built.
 - *Floods*: The people along the Ramganga in Bhikiyasain are severely affected by the cataclysmic floods of 2010. That year, the family of a Junior Engineer had been trapped in their house along the floodplains and the daughter had been washed away. This story was narrated to us by nearly every respondent. This, combined with the sandmining which causes erosion has led to the floods at Bhikiyasain being considered fearful by nearly all the residents. However, despite this fear, many residents still maintained that 'Both benefit and harm. Fields get washed away but it also brings sand with it.' Some residents clarified that 'because the spread of river is more, it causes less damage. Every alternate year floods are beneficial'.
- *Width*: The river floods regularly extend across the floodplains. Occasional high floods reach the market road. In Kamedua, floods regularly enter the fields, but it is only during the flood of 2010. that water entered the lowest house and the family had to evacuate.
- *Depth*: While two respondents mentioned the depth of the river as varying between 15-20 feet and 4-12 metres, the depth is difficult to measure. In this case, it is the width that will be the primary parameter.
- *Velocity*: Respondents did not specify a change in the velocity between now and past floods. People do not access the river during floods.
 - **Desired flows**: After describing the present and historical flows, the respondents were

requested to describe what flows they would consider most appropriate for the river at certain times, and why. In some cases we met with a little resistance as respondents pointed out that no matter what their desired flows were, it would be difficult to satisfy those expectations. However, most willingly participated in this exercise and described their ideal flow regime.

- **Summer**

Most respondents wanted flows that were the same as historical flows, i.e before large-scale pumping started. Some further quantified this statement by mentioning depths varying from 2 to 7 feet. However, with a very few exceptions, people wanted the past flows on the grounds that 'those were the natural flows for the river'. They also felt that it was more beneficial to the fish and washed away waste.

- **Monsoon**

Nearly all respondents wanted the flows to be the same as the historic flows. A few in Kamedua also specified that the water should not come up to their fields and mango trees. The reason for this was that water beyond the fields and mango trees 'would cause trouble'.

- **Winter**

Here too, people wanted water to be the same as historical flows. Several respondents also specified that the water needs to touch the edges of the river bed. Depth requirements varied from 4 to 10 feet. Atleast one respondent stated that this was important for the biodiversity, explaining that earlier crabs and shrimp were found in the water but are now absent.

- **Floods**

As mentioned earlier, the residents of Bhikiyasain seem to be scarred by recent high floods. Accordingly, responses varied when the respondents described their desired flood levels. Some continued to maintain that they would prefer historical flows. Others were more circumspect and required that the floods be 'within limits' and not reach the fields. When pressed for a reason, one respondent simply said 'people should not be washed away.'

2. Flows analysis for Marchula

The second section on the Ramganga as we proceed from the origin to the confluence. The river here flows close to the famed Corbett National Park. While this has greatly preserved wildlife in the area, it has also contributed to alienating the people from the river. In addition to the market place of Marchula, there are several small forest villages and resorts around the section.

- **Work done:**

Interviews were carried out in the villages of Baluli, Sankar and Marchula at the Marchula cross-section between 12th and 13th June.

- **Geography:**

The Ramganga at Marchula flows parallel to the road through the Corbett Park. The river here

has formed a broad stony bed bounded by a steep valley. The few villages in the area are located in the mountains on either side of the river. They are thus located considerably higher than the river. Another river also runs parallel to the Ramganga at this point.

- **Historical/mythological importance:**

A resident along the river told us that East flowing rivers are considered auspicious. At Marchula, the Ramganga flows towards the East. There is also a belief that sacrificing roosters in the month of June in religious ceremonies leads to wishes being fulfilled.

Here too, there is a confluence of three rivers - Ramganga, Devta Gadera, Badan Gaad. This 'triveni sangam' increases the spiritual importance of the place. The 'Narsingh' Temple at Balluli village is considered auspicious. Wishes are fulfilled there.

Other respondents spoke of the importance of the river as a whole and not just at Marchula. In the words of one such respondent, 'This river has kept the Corbett park alive. This river is revered. Cows milk was offered to the river. The fact that river has 'Ram's' name in it makes it auspicious. We worship it during crossing it everytime.'

- **Present perceived status:**

- **The national park status has prohibited fishing ,which has led to alienation from the river.**
- **This further means that the villagers do not exert themselves to protect the river from poachers**
- **Farming almost extinct due to animal conflict and purchase of land by hoteliers**
- **Villagers access the river for washing and bathing during the dry season.**

81% of the respondents are not satisfied with the present state of the Ramganga at Marchula. Of these, several people mentioned the increasing waste in the river. 'The water is dirty' was an often given reason for dissatisfaction with the river. This is attributed to the resorts that have come up along the river. These, the villagers said, discharge their waste directly into the river causing it to become dirty.



People also spoke of a decline in the amount of water in the river. Nearly all respondents mentioned a decrease in flow levels. According to respondents, pumping from river in Manela has now reduced summer flows. One respondent's description was typical of several others, 'Earlier when we would go the river banks for grass and wood collection then water would be waist deep. Now it is below knee level. In summers, water in the river has reduced a lot than before.' People reported that on average flows earlier were 50% more than those today.

The fish in the river is a major point of dissatisfaction. Traditionally, people extensively fished in the river. This has now been banned.

With the decline in fishing and agriculture, ecotourism is an option that some villagers are considering. Balooli is an example of this; two homestays have already been set up in the area. Some youth work as guides and would like to expand the opportunities available. Most visitors visit the park itself, and places like Balooli remain marginalised in more ways than one.

- **Livelihoods:** The presence of the Corbett National Park has had significant impact on people's livelihoods. Primarily, agriculture is now at a standstill. Hotels are increasing, and not all of them are environmentally responsible. Forest dependent livelihoods such as fishing are now non-existent. Migration is increasing, with most families dependent on remittance.

Agriculture: The people of Marchula, Balooli and Sankar are primarily agriculturists. A generation ago,

- agriculture was flourishing in the area. The fields near the village were irrigated by canals. The villages would be self-sufficient in food atleast where cereals were concerned. As little as 15 years ago, agriculture was flourishing. The fertile fields near the river yielded wheat, mustard, dals, groundnuts and ginger. Since then, agriculture has declined and is practically at a standstill today. The Corbett National Park is responsible for this in two ways.

First, there is an increase in animal attacks. One respondent narrated a tale of how all the food for his daughter's wedding was taken by elephants. Wild boars regularly visit the fields and ruin the crops. As a result the villagers have largely taken to planting ginger and chillies which are subject to less damage.

This too has decreased now because of lack of land. Earlier, planting on the fields close to the river enabled irrigation. In 1992, a major flood washed away the suspension bridge that led to Balooli. The same flood also washed away much of the fields near the river. The villagers never returned to those fields, instead choosing to sell their land to a developer. Some respondents allege that they were coerced into selling the land.

At present, agriculture is limited to some rain-fed farming in the village area, and to harvesting mangoes from the trees within the village.

Inclusion in flows analyses: Agriculture is an important part of how the villagers see themselves. This is illustrated by their keeping up at least some token farming even when it is not viable. Despite this, irrigated farming is now no longer an option. The animal attacks and sale of land have ensured that the fields will not be used even in the future. While asked for descriptions of flood levels, people largely equated them with access and with fishing, but not with agriculture. Agricultural needs are therefore not considered for flows analyses.

- **Fishing:** This is the most important livelihood in the area with a direct connection to the river. The people interviewed did not fish for income, but for food. While there is now a ban on fishing, people are not reconciled to this ban. This is not just for the loss of the food, but also of the companionship that community fishing involved. As a respondent explained, 'Fishing would be practised in groups. Villagers would go at the banks of river in 2-4 groups with ration and utensils for 10 days or so. They would catch the fish and smoke it on bamboo sticks. They would also dry the fish and get them back to the village, which also had medicinal use during cold and cough.'

Commercial fishing was done by outsiders. According to respondents, 'The people from 'Dhimar' tribe would come in a group of 15-20 from areas near Ramnagar. They would catch 1 quintal fish in 1 day by using explosives. They would carry back the fishes in bamboo baskets with ice and sell them in Ramnagar market.' People would try to stop them, but were often intimidated by the

large groups.

Several customs sprung up around fishing. The dahau festival mentioned during the Bhikiyasain interviews was also held here earlier before the ban on fishing. Young men from the villages would gather together, hunt fish and smoke the flesh on the river bed. This would mean that they stayed on the river for several of days. This experience was a pleasure that they looked forward to. The mahseer also later became a source of income for the villagers. The villagers were greatly in support of the mahseer conservation and angling program started by Mr. Sumonto Ghosh.

One of our respondents explained this in detail. He said, 'During the office of Shri Rajiv Bhartari, (the then Director, Corbett NP) 4 angling camps were formed in an extent of 16 km. A community of 16 villages was formed. Out of the share of angler's permit, a share of Rs 100 was given to the villages. By involving the villagers, mahseer conservation was also being achieved. Golden Mahseer population had flourished in the river. Before this initiative, villagers use to see the river as a curse. Later due to their involvement, it was observed that they had become aware and were participating in keeping a check to not use explosives. The perspective of the villagers towards their local resources had changed. They had become more sensitive towards issues like forest fire. After the ban imposed by government. situation is not very encouraging. Villagers can't approach the authority directly. The local leadership is missing. Some 15-20 years back, river water had algal bloom, due to which fish population was also affected. The same condition can be seen now. One day the river will go extinct.'

Inclusion in flows analyses: Though fishing is no longer a part of the livelihood of the communities that live by the river, it is definitely a part of the social fabric. When questioned about flows, several respondents mentioned the well being of the fish as the reason for flow levels. They also show a strong willingness to participate in a mahseer conservation effort like that done earlier. For these reasons, fishing has been included in the flows analysis.

- **Rituals:** The river at Marchula is culturally important due to it's being a confluence of three rivers 'Triveni' and due to the presence of the Narsingha temple. Cremation and ritual bathing are also carried out at the river. These activities need steady flows of low velocity and adequate depth, which were described by the respondents

Inclusion in flows analyses: Rituals such as bathing, cremation are important to the villagers. When questioned about flows, several respondents mentioned these while describing their desired flow levels. These have been included in the flows analysis.

- **Recreation:**

Swimming is a popular activity among the respondents, especially in the summer. For this it is necessary that the water be in a smooth and broad channel, and atleast waistdeep. Fishing, though a subsistence livelihood, has a strong recreational component. Both the *dahau* and the fishing to smoke fish for the village are highly enjoyed group activities. Participating in this would foster a sense of community among the youth. While this was mainly for the young men, the young women enjoy visiting the river and swimming in it.

In addition to these community activities are livelihoods based on recreational activities such as angling and bird watching. Several people act as tourist guides, nature guides, and operate homestays. Earlier, licensed angling was very popular with 16 villages and several local youths earning from the activity. While that has been banned, wildlife based tourism is still popular.

Inclusion in flows analyses: The health of the river needs to be such as to sustain otters and mahseer along with other wildlife. Respondents description of desired flows reflect this, and have been considered in the flows analysis.

- **Historical flows**

Respondents were asked to describe the flows as they recalled them a generation ago. This predates the large-scale pumping withdrawal. Most villagers also mentioned the time before the National Park was created, while talking of livelihoods. Nearly all the respondents reported a decrease in the quantity and quality of flows.

- **Summer:** All respondents mentioned a visible decrease in the flow since historical flows. They said that earlier it was difficult to cross the river in summers. In the words of one respondent, 'Some 25-30 years back when we would go for collection of wood in summers then water was waist deep. It was 5-6 feet and it was difficult to cross the river in summers. It was three times more than now. It was double some 10-15 years back. Now levels are only till knee.' Respondents also offered reasons for the decrease. Some attributed it to pumping withdrawal at Manela and by the resorts. Several respondents also mentioned that the springs in the catchment have dried up, and this has reduced the flow in the river. Respondents also referred to the cleanliness of the water in the river.

Residents mentioned depths varying between 5 feet deep to 3 feet deep at ford with some very deep pools.

- **Monsoon:** All respondents asserted that the water filled the entire river bed during the monsoon. Immediately after episodes of rain, the water enters the resort land. Some youth swim across, but it is widely considered to be dangerous.

People were unanimous in asserting that the water was far deeper than their height. They said that the water filled the river bed to 3' height on the right bank, while in drought years, it covered the riverbed.

The respondents also stated that before the bridge was built, they would regularly get cutoff. Children would need to camp near school during the monsoon

- **Winter:** The historical flows in winter were about 1.5 times the current winter flows. Respondents said that the water was slightly more than summer flows, about 6' deep with pools

- **Floods:** Floods have caused damage to the fields in the 1970s and most recently in 1992. This flood uprooted several trees and washed away the bridge that connected Balooli to the road. In most years, the flood water touches bottom of the bridge. The velocity is enough to uproot and carry away trees.

- **Desired flows:** After describing the present and historical flows, the respondents were requested to describe what flows they would consider most appropriate for the river at certain times, and why. In some cases we met with a little resistance as respondents pointed out that no matter what their desired flows were, it would be difficult to satisfy those expectations. However, most willingly participated in this exercise and described their ideal flow regime. In most cases, respondents desired flows were very close to the current quantities. They wanted cleaner flows, and also the right to access the river that they normally would.

- **Summer**

Current flows satisfactory. 3 feet deep near banks with some very deep pools. While historic flows were more, people were content with the present flows since they were sufficient for the fish. They did request cleaner water and control of waste inlet into the river.

- **Monsoon**

Current flows satisfactory. In the monsoon, the river fills the bed with water. The resort near the Ramganga is flooded in 3-4 days of rain. Nearly all respondents wanted the flows to be the same as the present flows. This was considered to be sufficient, any more would result in them being cutoff. Any less is perceived as not being natural.

- **Winter**

Current flows satisfactory. People said that winter flows should be slightly more than summer flows, about 4' deep with pools. This is sufficient for otters and fish.

- **Floods**

The people of the forest villages get cutoff from the road in times of flood. While this might have mattered less when they were self-sufficient in terms of food, it is now a severe inconvenience. People need to camp outside their village in order to work and attend school. This has led to an unanimous desire that 'Floods should be less. Else we get cutoff.'

3. Flows analysis for D/s of Afzalgarh barrage

The third section on the Ramganga is just downstream of the Afzalgarh barrage, which in turn is just below the Kalagarh dam. The section has the old Kalagarh town on its left flank along with villages that were settled after the second world war. A respondent explained, 'Father was settled here during second world war from Pauri. Forest was cut and the government allotted lands to people with one room and land for agriculture. Population was less. There was no water in village earlier. Daily routine included going to the river for getting water.'

On the right bank are some villages that were originally inhabited by Buksa tribals and settled by Sikhs after the partition. All these habitations were included in the surveys.

- **Work done:**

Interviews were carried out at the Afzalgarh cross-section in the first week of July. Villages both to the left and the right of the cross-section were interviewed. A PRA was also carried out at Kunwakhera between 31 October and 03 November.

- **Geography:**

The section is located near the place where the Ramganga leaves the Himalayas for the plains. It is also just below the first major disruption in the course of the river, in the form of the Kalagarh dam and barrage. From this section onward, the river is highly modified.

Most people in the area have settled here quite recently. Large areas of the land around Kalagarh have been settled by the families of martyred soldiers who were given land here. Many people in Kalagarh originally came here to work on the dam. Villages like Kunwa Khera are settled by Sikhs who came to India during Partition. The present generation, those born after 1970, have no recollection of a natural river. To them, especially after the catastrophe of 2010, the river is an enemy.

Despite all this, some people have both retained their collective memory of the river and have forged new relationships with it.

- **Historical/mythological importance**

This is the only site where the majority of people confused the Ramganga and the Ganga. Several people, when asked about the importance of the river, replied like this respondent, 'Ganga is Ganga. River originated from Badrinath, Kedarnath. It is shrine for us.' This was primarily in Kalagarh and Jamunwala where two separate events have led to this loss of oral history. The last generation was not born here. According to the respondents, they were 'were settled at the time of second world war from Pauri' and so could not learn about the Ramganga from their parents. The younger generation were born after the dam, and equate the river with sudden releases of water and the ever-present fear of drowning.

The people along all the other sites along the river relate to the river in a manner akin to the way a child relates to his/her parent. There is an acknowledgement that even



when in some cases the river may cause harm, it largely does good to the people who live along it- the overwhelming emotion to the river is that of gratitude. This is reinforced by songs and rituals that celebrate the river.

Only at Kalagarh, the primary emotional reaction to the river is that of fear. Bathing 'during festivals, Durga Puja, Gurunanak Jayanti' is still carried out.

- **Present perceived status:**
 - **Great fear due to 2010 flood**
 - **Decline in agriculture and floods have led to a surge in sandmining**
 - **Fear of unannounced releases has also led to a decline in the traditions observed along the river.**

People are unanimous in their dissatisfaction with the river at present. Before the dam was constructed, people would often go down to the river for work and for pleasure. This changed with the construction of the dam. One respondent summed it up saying, 'Waist deep water use to flow which dried after coming up of dam. Sand mining is rampant. River is changing its course every year. When water is not released then river has only seepage water. '

All villages in the area have seen considerable damage due to the river during floods. Especially in 1978 and 2010, the floods caused considerable damage. Several lives were lost in each. Any conversation about the river invariably brings up the night of 2010. This fear of surges is compounded by the water scarcity at other times. One respondent explained, 'Flows have stopped. Water is not released after 15 June. Some 55 years back, river flows were continuous for all 12 months. Before dam we would not suffer losses during floods. Now water is released from the dam whenever it is more and we suffer losses.'

This disruption in the flows has drastically affected resource-dependent livelihoods. As one respondent described it, 'Earlier due to good flows, our livelihoods could be sustained. Livelihoods dependent on river are now completely over. Agriculture and animal rearing is most affected.'

In addition to livelihoods, the fear of sudden releases has made people uneasy with the idea of approaching the river. One of the questions in the survey questionnaire is whether the practice of rituals has been affected by the river's condition. At all other sites, we have observed that people make the effort to carry out their rituals despite heavy pollution and low flows. This is not the case downstream of Afzalgarh barrage where people spoke of water that is not enough to either bathe in or to carry away the ashes after cremation. People also feel vulnerable to sudden releases when bathing. One respondent explained, 'Coming up of dam is a danger to us. 'Dia tale andhera'- it is always darkest under the lamp. We are under constant fear.'

It is not just peoples' lives, but that of all wildlife that has been disrupted by the dam. This also is recognised by the respondents. 'We would go for bathing. Now water levels are reduced in the river which kills fishes and does not leave enough water for animals. Natural flows are lost after coming up of dam. '

◦ **Livelihoods:**

People continue to depend on the river for their livelihoods to various extent. In the area, the primary livelihoods are agriculture, fishing, sandmining, and collection of grass.

▪ **Agriculture:**

The Buksa tribals who originally lived along the river were primarily hunter-gatherers without a bent for agriculture. This tradition continues today. The later settlers are all first and foremost agriculturists. This is therefore a crucial part of their lives.

The second and third waves of settlers were people given land shortly after independence in 1947, and those settled by the army in 1955. These people cleared the land, made farms, and began to till the land.

'Wheat, Dhan, Sugarcane, soyabean were planted on flood plain. Earlier, farming was based on animals, now machine dependent. Population was less and so was agriculture.'

described one

respondent. While artificial means of irrigation were not used, soil moisture levels were adequate for these crops due to occasional high flows which inundated the land.

Since construction of the dam, a respondent said, 'In June at the time of irrigation, water is not released. Flows are stopped according to dam officials. Our requirements are not taken care of.' This sentiment is echoed by nearly all the downstream farmers, including one respondent who informed us, 'Water scarcity has negatively impacted productivity. Yes. In the month of June at the time of irrigation.' In an effort to continue farming, the farmers have taken up tubewell irrigation. Groundwater levels have now dropped from 15-20 feet in the sixties to 45 feet today. This further increases the cost of irrigation, a fact resented by the farmers. Several farmers echoed the sentiments of this respondent, 'seeds, water, everything has to be bought now.' One of them calculated the money that they are spending because the river is not not allowed to run free,' If the motor is run for I hour, diesel costs Rs 70-80. It is run for 15-20 hours. If we get direct water then we can save Rs 15-20 000 in months of April and June.'



Inclusion in flows analyses: Agriculture was once the mainstay of all the villages in the area. Today, though they cannot longer depend entirely on it, it still provides them with some part of their income. The farmers are extremely vocal about the impact of the change in the flow patterns and the flows they desire. Agriculture has been included in the flows analyses.

- **Fishing:**

Before the dam was built, fishing was a big part of people's lives. A respondent recalled catching 'Mahseer, Rohu, Kalog, Goonch – the biggest fish had to be caught by 4 people'. This abundance of fish also corresponded with the general health of the river as a respondent remembered, 'Earlier fishes were found in river. Water was clean and people visitng their fields would drink it.'

This changed with the construction of the dam. Since then, from this point in the river, fishing is not as per the natural lifecycle of the fish, but as per dam releases. Some respondents still visit the river to catch fish when the dam gates are



closed. People in Kalagarh and Jamunwala have significantly decreased their fishing, especially after 2010 due to fear of the dam gates opening. Even when they do, it is for occasional personal consumption.

For the Buksas of Kunwa Khera, fishing is done in all the seasons. The main livelihood of the Buksa community and main dependence on the river is in the form of fishing. The Dam in the river is seen as an obstruction in the fish coming downstream. From the barrage in Bhagota village (Harewali), a small fish (*Moile*) migrates upstream. Apart from that, *Singha* and *Bhatt* are other fish varieties found in the river. Most of them do not own lands for agriculture so they rely on fishing for the entire year.

Inclusion in flows analyses: Fishing was once an important occupation and source of livelihood. Changes in flows have essentially wiped out both the fish and the occupation. With provision of adequate flows and connectivity, it is probable that the fish populations will increase. For these reasons, fishing has been included in the flows analysis.

- **Rituals:**



Cremation site and people bathing after rituals near river bank

Rituals such as mundan, cremations are carried out regularly at the riverside today. Ritual bathing is carried out on 'Shravan, Kartik Dusshera. Every full moon there is a big mela in the market'.

However, these are often obstructed due to the 'controlled' nature of the river. As one respondent said, 'Due to less water, rituals during cremation can't be performed properly. People don't take bath in the river always. If river flows nicely then only bathing can be done.'

Among the Sikhs of Kunwakhera, holy bathing or worshipping of the river is not explicitly done. At the banks of the river, people offer flowers after cremation. A fair during *Gurunanak Parv* is held in months of November during which some people from Sikh religion go and take bath in the river. Buksa tribe celebrates *Nahan* Fair at Ganga and perform rituals like 'Mundan' and cremation at its banks.

Inclusion in flows analyses: The rituals, traditions and festivals associated with the river serve to link the people to the river in a period when their agricultural rhythms are sadly disrupted. Rituals have been included in flows analysis.

- **Sandmining:**

Sandmining is prevalent in the river. Conversations at Kalagarh and KunwaKhera indicate that it started with the need for sand for the construction of the dam. People would tender for the sandmining contracts. At that time, according to a respondent, the occupation employed 50-60 vehicles with 10 labourers each and drivers and owner. This would also sustain shops of puncture repair and tyres etc'

Later, this was banned by the forest department. Some sandmining was still carried out clandestinely. The respondents argued, with some justification, that the disruption of flows had caused agriculture to die out. They were left with no option but to work as labourers for the people who extract sand. This activity again surged in the last five years. As the residents of KunwaKhera explained, 'The land near the river is not fit for agriculture due to cutting and sand deposition by the river. Farming on this land stopped after the 2010 floods, depositing stones on the land.'

People acknowledge that the sandmining has affected the river, 'Form of river has changed due to sand mining'. However people on both banks of the river attributed the increase in sandmining to the damage done to the river by sudden surges. Thus, they pointed out that the dam has created a vicious cycle where a disruption in the river causes a decline in agriculture, which causes people to take to sandmining, which further damages the river.

Inclusion in flows analyses: Sandmining is not an occupation that people have taken on willingly. While 'everyone does it' as a respondent claimed, there is both an element of shame and uncertainty in being involved in an illegal business. All the people involved said that they were participating in this because the lack of regular flows have made agriculture impossible. Sandmining is thus a function of an unhealthy river. It has not been included in the flows analyses.

- **Historical flows**

The river was a perennial river, with gently rising and falling flow levels. These flow levels were predictable, and so the people did not feel threatened by sudden changes.

- **Summer:** 3-5 feet near the banks and more than 10' in the central part. The form of the river has also changed with the dam. Earlier, it was narrow and deep. This has been changed to a broad river. One of the respondents said that collecting firewood from the riverbed was easier earlier. Now it is more difficult. Also, the river flows were perennial, or as a respondent said, 'the Ramganga flowed for all 24 hours.' Both the velocity and the depth were enough to wash away the ashes after cremations.

- **Monsoon: The river flowed full and wide in the monsoon.** 'Earlier much water, now depends on dam opening. Earlier the water would fill river bed'. **It was usually** about 25 feet deep a few feet from the banks and touching the sides of the banks.

- **Winter: 5-7 feet deep near the banks. Was narrow and deep.**

- **Floods: Before 2010, there was a bridge at Hera Basti. The floods regularly** 'Touched bottom of bridge, which is 35' above the bed'. One respondent wanted it noted that 'Historic floods didn't cause so much damage as now.'

- **Desired flows:**

People want a semblance of a natural river where the ebb and flow of water levels is as per the season. The present unpredictable fluctuation between a dry river bed and damaging floods is stressful to the people

- **Summer: The people living downstream of the dam see-saw between excess and scarcity. As one respondent put it, 'Water is less but village gets flooded during floods.'** **Nearly all respondents wanted freely flowing water in the river.** Around 3-5 feet near the banks. Prevents stagnation

- **Monsoon:** Historical levels. About 25 feet deep, and touching the sides of the bed.

- **Winter:** Historical levels. 5-7 feet deep
- **Floods:** Floods should be less. Traumatized by 2010

4. Flows analysis for d/s of Harewali barrage

The fourth section on the Ramganga is just a few kilometers downstream of the Harewali barrage site. This, in turn, is just below the Kalagarh dam and Afzalgarh barrage. Consequently, peoples' experiences of the river are dominated by the dam and its impacts.

◦ **Work done:**

Interviews were carried out at the Harewali cross-section in the first week of October. Villages both upstream and downstream of the barrage were interviewed. In addition, tourists and recreational fishermen were also interviewed. This was followed by a PRA at Parmawala, the village closest to the section.

◦ **Geography:**

The section is a few kilometers downstream of the Harewali barrage. Water is impounded here during the post-monsoon period and diverted into the canal that leads to the Khoh barrage. Thus, the entire area upstream of the barrage is flooded for a large part of the river, with practically no releases downstream. The only time water is released from the barrage during the Rabi season is when the canal needs maintenance. In such cases, no warning is given to the villages downstream, seriously endangering their lives. Despite the disruption in the flows, the area is still a haven for wildlife. Due to the impounding, there is a wetland created upstream of the barrage. However, agricultural practices are utterly disrupted.

The three villages closest to the barrage both upstream and downstream were visited for interviews. Bhagota, a village upstream of the barrage, is experiencing a reversal of flows. They see flooding for the months between November and March. Thus, a village that earlier planted three crops a year is now confined to one uncertain crop a year.

Parmawala and Mau Shahajahanpur are downstream of the barrage. They are now experiencing very low flows with practically no flowing water below the barrage. The only time the river has flows is when they have unplanned releases from the barrage when the canal is being repaired. This causes sudden floods which have led to deaths in the villages.

The people downstream have been campaigning for a relocation. As was explained to us, 'In 2011 the government identified alternate land for villagers. Everyone was ready. But only people were being shifted, not the land (the land being offered them was not comparable to that at Parmawala). Some farmers objected to being shifted from where they were. So the plan was abandoned. DM, SDM, ADM had all come and promised to shift village and give an embankment of 3km. The village is in jaws of death. If flood like 2010 comes again, then place will get destroyed.'

- **Historical/mythological importance**

This is the first point along the course of the river where the notion of the Ramganga being an 'unwed river' is in place. As a resident explained, 'Just like Haridwar has 'Badi Ganga', this is 'choti Ganga' and is unmarried. Which is why she is angry and causes damage'. This is also reflected in a song called 'Tu kis gun kunwari rahe gayee re Ramganga'. The idea of the restless rivers being 'unmarried' is usually typical of Bihar, and so this perception applied here to the Ramganga might indicate that it was first settled by people from outside the area.



We were also told a story of settlement in Parmawala which supports such a theory. They spoke of a major battle at some time in the past. The soldiers fighting the battle had their families travelling with them. Of these, some women were pregnant. These camped at a quiet place next to the river with their families. After the battle, the soldiers came and joined them. Some decided to stay there permanently, and so the village came into being.

- **Present perceived status:**

- **Extremely low and stagnant flows downstream of the barrage**
- **Sudden unplanned releases cause severe damage to the fields and also sometimes cause loss of life**
- **Impoundment upstream may have created a wetland, but has impoverished farmers in Bhagota.**

The dominant feature of life along the Ramganga at Harewali is the barrage. This exerts a despotic authority over flows (or the lack of them). As one respondent simply put it, 'It is now regulated. We have upside down water' referring to the fact that the village lands in Bhagota-upstream of the barrage- are flooded during the Rabi season and exposed during the Kharif. The people of Bhagota now only can raise one Kharif crop of rice in the brief window of time before their lands are flooded again.

Downstream, it is an entirely different picture. The water that flows past Parmawala has, in a manner of speaking, been sieved through a dam and two barrages before being forced through the sluice gates. It thus has deposited a lot of the organic matter it would usually carry in its course down from the Himalayas in the reservoirs of these. Not only does this mean that the villages downstream are shortchanged of the fertile silt they expect, but the high-velocity releases of clear water abrade the stream and cut their fields. Also, the floods are greater in

magnitude. As a resident explained. 'The damage is due to water from kalagarh. Kalagarh holds back the water. And release it all together. So we get water from rainfall plus dam releases'. This has negative impacts on agriculture as a farmer explained, 'Kheti mar gayi hai' because of floods. After the floods, we have to do lots of work. This includes removing stones. We also need to add more manure. After the 2010 disaster, we could not do agriculture there for 2 years. Depended on assistance from Government. Even now not it is same as earlier. Plus sometimes dam releases water before dhaan is cut. Then the entire harvest is lost.'



These releases are not as per the rainfall either, but governed by the state of the Kalagarh dam. This means that the people along the river cannot accurately guess when their lands will be flooded. The people lucky enough to have friends and family living in Kalagarh are dependent on phonecalls warning them that a surge is on the way. They then inform their neighbours. There is no system in place that is actually of use to the people of Mau Sahajpur and Parmawala.

The flood of 2010 was cataclysmic. There are floods every year that are not much less in the magnitude of their devastation. A respondent graphically described how she and her husband held up the heads of their buffaloes all night during the floods so that they would survive.

When there is no flood, there is stagnation. There are no releases at all during the winter except when the canal is closed for maintenance. This means that there is no flowing water in the river, only occasional stagnant pools. Farmers and children visit the river looking for clean pools to water their livestock. As one respondent said, 'Stagnant water stinks. It is damaging for animals if they drink it'. When on the river bed, they are in ever-present danger of sudden unannounced releases. One respondent explained, 'Water is usually in canal, but sometimes there are sudden releases in river. This is when maintenance in canal is needed. If we are in the fields when water gets released, we need to stay in fields'

One of the questions asked during the interviews was if the respondent is satisfied with the present status of the river. One respondent simply replied, 'How can it be?' All is gone'

- **Livelihoods:**

Downstream of Harewali barrage, the community is primarily agricultural. Since the coming up of the barrage, even paalage farming is on the decline. It is now mainly sugarcane that is being planted, with some vegetables. A few people catch fish, especially in Bhagota, but this is almost entirely for consumption with very little sales.

- **Agriculture:**

From 15 November to 15 June, the barrage gates are closed and the people's farmlands are flooded. This negates any chance of the Rabi and summer crop seasons for the villages upstream. Instead of the wheat, maize, and vegetables that they would plant earlier, the farmers now are restricted to paddy cultivation during the Kharif season. Sometimes, the dam gates are not opened till after the scheduled 15 June date. This means that the farmers lose out on the sowing period. Similarly, the gates are closed before the middle of November, which means that they lose the harvest.

The agricultural cycle of Shahajahanpur and Parmawala is forced to move on a diametrically different level. For them, the months between June and November are a time of intense floods. The full flows during the 'chaumasa, the four months of monsoon, they can live with. What causes them distress are the unannounced releases prior to and after the chaumasa.

'Paalej' farming used to be done along the silty banks of the river after it recedes post-monsoon. Now, often unexpected floods come in the late monsoon, or early in the season. Further, the dam has altered the sediment characteristics so that instead of bringing in fine silt the river brings in coarse sand. This decreases yield even further. A woman interviewed at Mau Sahajpur is the last of the



Paalej farmers in that village. People no longer practise what they term a gamble.

Instead, those farmers lucky enough to own land have gone in for sugarcane farming. This crop withstands flooding, but it too can be flattened by the sand brought in during 'emergency' releases. Such a release not only took away a respondent's fields in Parmawala, but also his 20-year old son. The young man had gone to the fields to strip the leaves of sugarcane for fodder. There was a sudden release of water, and he was never seen again. A sign posted on the barrage relieves the dam authorities of any culpability in such incidents.



Inclusion in flows analyses: Agriculture was once the mainstay of all the villages in the area. Today, though they cannot longer depend entirely on it, it still provides them with a large part of their income. The farmers are extremely vocal about the impact of the change in the flow patterns and the flows they desire. Agriculture has been included in the flows analyses.

▪ **Fishing:**

Fishing is no longer as per the migratory cycle of the fish, but as per dam releases. When Kalagarh opens its gates, the fish from the reservoir are washed downstream, only to be trapped at Harewali. This is when the people of Harewali move in to harvest the trapped fish. Thus more fish is obtained during the end of the monsoon and in the winter. This is done from rude boats made of inflated tyres. The fish caught is sold in the village and in nearby Dhampur



Any fish that manage to go downstream of the barrage find their way barred on their way upstream. The fish upstream of Kalagarh are isolated, their breeding rhythms broken. Just a generation after the building of the dams, the fishers are already seeing the impact of this isolation of the fish breeding populations. Fish sizes have decreased, and the relative proportions of different species are changing. One

respondent said, 'Earlier big fish were found in (khulli) open Ganga. Now only smaller fish are found. Singhara, Gaund, Bum fish are not found now.'

Inclusion in flows analyses: Here as in Marchula, when questioned about flows, several respondents mentioned the well being of the fish as the reason for flow levels. People link the flow levels to the health of the fish. In the words of one respondent, 'Good catch for bigger fishes like Lachi and the amount of fish catch also increases. Milankar and Goed lay eggs in the monsoon.' Fish are a crucial source of protein for the farmers in the area. For these reasons, fishing has been included in the flows analysis.

▪ **Rituals:**

The main event is the Nahan fair in November. It is a much awaited event, participated in by people from all the surrounding villages according to one respondent who said, 'people from 10-20 villages come for fair. Earlier more people would come since it was the only fair in Kalagarh area.' Since the barrage was built, people's access has been disrupted. One respondent wistfully told us, 'When small, I was never blocked from going to fair.' In addition to this event, rituals such as mundan, cremations are carried out regularly. There is also a belief that if prasad is offered to the river, she will grant any wishes made.

Inclusion in flows analyses: The rituals, traditions and festivals associated with the river serve to link the people to the river in a period when their agricultural rhythms are sadly disrupted. Rituals have been included in flows analysis.

◦ **Historical flows**

Several of the respondents remembered a time before the barrage. In their words, 'the barrage holds back water. Earlier the Ramganga would flow 'khulli' (open) and full'. This was also a time when the Ramganga would provide them with crops thrice a year, with clean water for their livestock, with fish, and the 'sarkhada' grass to thatch their roofs.

- **Summer:** The Ramganga was a perennial river. The depth varied between 2-7 feet across the channel. There were also deep areas where the depth was 10-20 'Gaththi' (5 hands- 1 Gaththa)
- **Monsoon:** The width of the river extended upto the fields, which is approximately a 1km spread. At Harewali, people mainly spoke about how quickly the floodwater would recede in the monsoon. After the barrage, they say the water is hemmed in at several places and has 'no place to go'. Stagnant water stays in the area even when the gates are open.
- **Winter:** People's recollections of the water in the winters ranged from chest to above the head, or between 4 to 6 feet deep. As in summer, there were also deep areas where the depth was 10-20 'Gaththi' (5 hands- 1 Gaththa)
- **Floods:** People are unanimous in saying that floods have increased both in magnitude and frequency since the barrage was built. In the words of one respondent, 'Earlier would recede sooner. No frequent floods before barrage.' The other change people see is the duration for which floods persist. One response was, 'Some floods, area would be flooded for 2-4 days. Last 5 years

water stays for 2 months ..where would we go abandoning the village like that.' The floods also lead to extensive erosion downstream of the barrage, '5 years ago, river was flowing on Thakurdwara side. Later it shifted atleast by 50-60 meters. This side banks are stable. The unstable banks keep eroding. 50 years ago, river was only 50 meters away from village. In 1978, flood submerged the entire village.'

- **Desired flows:**

The people both upstream and downstream of the barrage can be forgiven for desiring the return of their 'khuli' Ramganga. Sadly, they are realists and understand that this is not likely to happen. And so, instead of desiring a particular set of flows, people's desires are curtailed to the bare minimum

- **Summer:** Most responses requested water a little above knee level. This, they said, would be adequate for agriculture.
- **Monsoon:** Here, respondents seem to be mainly looking for damage control. They offered various ways in which this can be done. This ranged from a desire for natural (pre-dam)flows, to a request that the gates be opened in time.
- **Winter:** Here, people are concerned with untimely floods. The people upstream want respite from continual flooding, while the people downstream want relief from unplanned releases. While some people did express a desire for pre-dam flows, most merely wanted the government to stick to the published dates for release of water. Unplanned, unannounced releases of water cause a lot of damage to the property and the lives of the villagers. One respondent also requested, 'There should be a flood warning system in place. People need to be told. '

- **Floods**

Despite the extreme and artificial floods they face today, the farmers still appreciate the value of high flows. One resident put it in an understated way, ' Usually floods are okay except when a big wave comes from the dam and then there is damage.' Problem is when suddenly water held back behind the dam is released.

5. Flows analysis for Agwanpur

The fifth section on the Ramganga is close to Moradabad. People here still live a mainly agricultural lifestyle, but their connection to the city means that they have a sense of the river as a whole and are able to discuss the changes it has seen. Interviews with farmers yielded interesting information about the economics of small farmers.

- **Work done:**

Surveys at Agwanpur were carried out in the second week of October. Responses were obtained from farmers, shopkeepers, timber merchants, fisherfolk and householders. Detailed information about the various trades associated with the river, including fishing, vegetable farming, raising tree nurseries, and timber was obtained.

- **Geography:**

Agwanpur is the section downstream of the both the barrages on Ramganga – Afzalgarh and Harewali - where again the impact of barrage on flows and livelihoods can be observed. The banks are characterized by vast flood plains with deposition of silt and sand, patches of riparian vegetation and seasonal crops on both sides. The



town of Agwanpur lies a kilometer and a half away from the river bank with farms on both sides of 'kuchcha' road. Community of 'dhimar' fishermen occupy a separate area in the town.

- **Historical/mythological importance**

“Our ancestors must have settled here because river water was used for trading earlier. There were no roads. So, people settled near banks of river earlier for transfer of material across river banks through boats. “

Like other sites, people living in Agwanpur also shared stories passed through generations as oral histories and their beliefs with research team. According to belief in Hindu religion - during his exile, Ram was rowed across this river by a boatman. The river, since then started to be called as Ramganga. It is dear to Ram. The bride and the groom are taken at the bank of the river for prayers. Rituals like 'Achaman' are performed. Holy bathing and fair is organized at its banks.

People from Muslim community have been living here for generations. Their cultural association with the river was shared with the research team. Allah created river for our benefit 'अल्लाह ने फायदे के लिए बनाया था'. People from all religions put up stall at the fair organised on river bank.

- **Present perceived status:**

- **Bed scouring and sand deposition by river on fields**
- **Sudden unplanned releases cause severe damage to the fields and also sometimes cause loss of life**

People have an understanding of the space of the river and its floodplains. 'Ganga's house is large' 'गंगा का घर बहुत बड़ा है' said one of the respondents in a group discussion.

The dam was constructed during 1970s. Before that water would flow continuously. Now water

is held back behind the dam for electricity generation. Some respondents strongly expressed that they have no benefits from this dam, only losses. Benefited areas would be where the canal water or electricity generated from the dam is being supplied and not at the places downstream.

One respondent said, 'Post barrage construction, river does not bring the same amount of silt load with it. We all live here only in Agwanpur and all of us live at banks of river, familiar with all its moods'. Presently, people



perceive lesser flows in the river in summers. Villagers take the livestock at the river for bathing and drinking water. 'Had Ramganga not been here where would our animals drink water from?' The water quality has also deteriorated and if one consumes this water, there are chances of falling sick. Paalage farmers do not drink water directly from river, but access it by digging small burrows near river bank.

In winters, water in river would be more than summers and more than current winter water levels in river. A bridge 'katiya' would be made for crossing the river, meaning that water would be above head level.

In monsoon, river would spread more, reaching till our jungles. Now water in the river is less and river takes less space.

This dam is of no use to Agwanpur. May be where it send electricity and water from irrigation, there it is of some use. But of no use to us.

The river, in absence of barrage, would bring in silt from the mountain and deposit on fields during monsoon and flooding. This would enrich the soil fertility. There were more fish in the river than now.

The dirty water from Siwara mill is flowing in the river since the last 40 years.

Presently due to bed scouring the water erodes the bed and deposits sand on the fields which is interferes with farming near the bank. The mill releases deteriorates the water quality and kills fishes. The channel is unstable and keeps shifting. This reflects in relocation of settlement by people according to river movement - 'बहुत गाओं उठ गए'. Some respondents pointed out low population of fishes because of reduction in flows.

◦ **Livelihoods:**

Downstream of Harewali barrage, the community is primarily agricultural. Since the coming up of the barrage, paalage farming is on the decline. It is now mainly sugarcane that is being

planted, with some vegetables. A few people catch fish, especially in Bhagota, but this is almost entirely for consumption with very little sales.

▪ **Agriculture:**

The farm land is in the river and up above on lands also. Growing cereal crop is avoided near the river because the water surge damages the crop.

‘After the 2014 floods, at least a 1000 *bheega* land is left unfit for crop. Now we will sow Paalej in it. But still some land is where even Paalej can't be sown.’

There is a strong memory of 2014 floods as it caused a lot of damage to the crops. Besides Paalej, farmers engage in growing vegetables and cereal crop. Paalej is grown near the river bank where river leaves the sand reducing the fertility of land. The Paalej crop gets affected by sudden releases from dam. Vegetables and cereal crop are grown on land at a distance from river bank.

Eucalyptus and Poplar are grown in the area since the last 20-30 years. Some farmers explained that it is due to uncertainty in flows and river leaving the land unfit for agriculture due to sand deposition that people started growing Poplar and Eucalyptus. The eucalyptus and Poplar farming started nearly 20 years ago.

Earlier floods would bring good soil benefiting agriculture. Now it brings blue colored clear waters downstream of dam. The sand that river now deposits in our fields is what it picks up from one bank and leaves onto the land. Sometimes it has happened that we and our animals 'dhor' have gotten stuck into the sand. Earlier there would be good amount and quality of melons and water melons in the sand that river would bring from the mountains. The water melon would be big in size than now.

The dam officials inform us about such releases. But then where shall one take their fields?

‘खेती को कहाँ ले जाओगे उठा के’ We can manage to ourselves, our domestic animals. But we can't save our fields. Since then people started to plant eucalyptus and Poplar near the river banks as there is less economic loss in that. River keeps cutting the fields, sometimes 50 bheegas here sometimes there. Sometimes river cuts 50 Bheega here some times there. There is no arrangement. we face a lot of trouble. This is like any other river.

Earlier river's water would keep flowing. Now suddenly water comes from the dam (‘डैम वाले पानी धोके से छोड़ देते हैं’). Earlier flows wouldn't stop even during the rains. So flooding would not occur. Now since water is stored behind the dam so during monsoon they will have to release the water if it comes in large quantities from upstream. Less water flows in summers and winter in river now than earlier. Animals like hyena and bhaggara were seen near river banks drinking water.

Number of bluebills in the area have increased now. They destroy the fields. We can not grow udad, harera now. They eat away gourd, mangoes also. Now expenditure on agriculture is much

more than before. The fertiliser costs us around Rs1100 a sack. The expenditure is somewhere around Rs 2200 a quintal. Palagae farming costs us around Rs 5000-6000 for one Bheega (752 sq feet) land, sugarcane is Rs 6000 a bheega. Changes are in labor costs, also we don't get adequate price for crop. Once the harvest is out from our hands, people quote a higher price for it than what we get. Sometimes income generation is possible sometimes not. In case fields are damaged in floods.

Earlier dhan could be grown near river banks. Dhan can't be grown near river banks now. This is because the floods washes away the crop near river bank. The investment in cereal crop and dhan is a lot in terms of labor costs, 'jutai' and if floods come suddenly then there is lot of economic loss and no returns.

The crop pattern at river bank has changed because dam's water is released suddenly. Earlier water in river would keep flowing and would rise only in case of rains (monsoon). Dhaan, Pulses crop (udad etc.) and wheat were the main crops earlier.

Inclusion in flows analyses: The changes in flow pattern does affect farming. Bed scouring and sand deposition in the fields is a phenomena observed frequently since last 40 years or so. The elder generation of farmers described the changes since the 40 years and about the impact of the change in the flow patterns on farming. Agriculture has been included in the analysis

▪ **Fishing:**

People from the ' dhimar' community were interviewed to understand the practices they follow, their perception regarding changes in flows and impact on fishing livelihood. There is change in number and variety of fish found in the river. 'In its waters were found fishes like Bhirka, Firanga, Moy, and also Tortoise, Naka crocodiles which can't be seen anymore.' Earlier fish varieties found in river were Rohu, Keral, Lachi, Sol, Mahseer. Now these fishes don't come with river water. It also had big heavy weighing crocodiles (नाका), tortoise. 'I have myself killed fish (Patal) of 6 'darri' confirmed one of the fisherman.

Fish varieties identified in the river were Chaal, Rohu, China, Keral, karala, Lachi, Singhara, Sol. They said that more fishes are found during Chaumasa. Varieties like Mahseer and Gonch can be seen during monsoon.

People do fishing almost everyday and sell it at the ' Hartela' market in Moradabad. Total number of people from Dhimar community were nearly 35 in village Less number of people from younger generation practice fishing.

River become dry in summers now. When the dhimars go for fish catch at the river, they can catch the fish directly by hands. Earlier always 3-4 feet of water would flow. Flows would not stop. Now water is stopped by the dam and fishes are not found in great abundance as they would.

Inclusion in flows analyses: Fishing is closely linked to river flows, both to provide a habitat for the fish, and to allow the fishermen to harvest the fish. The Dhimars are the traditional fishing

community of the Ramganga and their identity is tied to this occupation. Fishing has been included in the flows analysis

Rituals:

Nahan and Dusshera fair is organised on river banks.

The number of people visiting the fair has now reduced. People now take bath at their homes in tap water. River water has also become dirty now due to discharge from mills. Earlier water would be clean and more people would come to take bath at river banks.

Rituals performed at river banks include cremation amongst Hindus and offering ashes to the river. The flowers and bone remnants are then offered to Ganga ji at Haridwar.

Inclusion in flows analysis: Rituals maintain peoples affinity to the river. They also serve as a record of seasonal changes. These have been included in the analysis.

◦ **Historical flows**

River was perceived to be wider than now. Water storage by barrage and sudden releases have altered the natural flow regime.

- **Summer:** The Ramganga would flow continuously. The depth varied between waist and chest levels near the banks.
- **Monsoon:** The width of the river extended just upto the cemetery in the town.
- **Winter:** People's recollections of the water in the winters ranged from chest to above the head, or between 4 to 6 feet deep.
- **Floods:** Flood water would reach upto the cemetery in the town. The spread was around 1 to 1.5 km. It would also enter into the town during peak floods.

◦ **Desired flows:**

People are clearly affected by altered flow regime and desire the familiar old river that they had learnt to live with for generations, familiar with its moods.

- **Summer:** Around waist deep to upto head level in deepest part is how people remember the river in summers and desire similar summer flows.
- **Monsoon:** The levels desired were governed by impression of the friendlier river that would not cause much damage to the associated livelihoods, as expressed above.
- **Winter:** Since the farms extend close to the river people desired chest deep winter flows as this would replenish the river and is good for fish population to thrive in its waters.
- **Floods**

People are clear that in their memory the historic floods were not so intense. Water would recede and bed scouring would not happen.

6. Flows analysis for Katgarh:

The Katgarh section is just on the outskirts of Moradabad, below the railway bridge. Its proximity to an urban area has led to a diversity in cultures and livelihoods along the river. However, this proximity has also led to great pollution. This pollution load is not just organic, but laden with toxic chemicals. The Kalagarh dam has played its role in reducing instream flows. Thus the site is facing problems of both quality and quantity.

◦ Work done:

Interviews were carried out at the Katgarh cross-section in the first week of July. Settlements both to the left and the right of the cross-section were interviewed. A PRA was also carried out at Barwalan Basti between 28-30 October.

◦ Geography:

This section is located in Moradabad town, just below the railway bridge. The riverbed here is silty. On the right bank is Barwalan Basti, a part of Moradabad. This is very close to the river and so inundated nearly every year. Earlier the river flowed through what is now the Basti. Today, a temple marks the spot where high flows once reached. Now it flows on the left bank upstream of the bridge. From just upstream of the bridge, it forms two channels which flow on both the right and left banks. On the left bank of the river are several villages that still maintain their rural way of life and are primarily agricultural.

◦ Historical/mythological importance

People have memories of a healthy and abundant river. Since then, the river has been in decline. One respondent said, 'Earlier water was clean and clear blue in color. People could see the turtles, fishes and coins in the river. After 1975 and coming up of Ramganga Dam, condition of river has worsened. The canal has diverted water for supply to Narora. Now water is so dirty, people have stopped drinking it or taking bath in it.' This sentiment was echoed by another respondent, 'The fairs occurring here at the banks of the river are 'Parvi Ka mela' and Ganga Dusshera. Earlier people use to come in carts and by trains but now that the river has become dirty, less number of people come. We also use to take bath a lot in the river water but now we don't. Earlier the water was clean and white in colour like milk. Now it is not so since the last 30 years. More water use to flow earlier than now'. A respondent recalled that the river was also high in biodiversity, 'Fishes use to come. Crocodiles, group of turtles could also be seen. Once some 45 years back in my childhood, we saw star fish floating on the river surface and it was so fast. The bamboo would float and come with the river water from Kashipur. The quality of life of people living at river banks was good. Paaleej farming of melons and water melons could be seen.'

Despite the decline in quality, people along the river continue to venerate it even today. As per one respondent, 'This is mother for us. We go for bathing there. This is mother's abode. This is an old tradition and holds importance. We worship the river for attaining salvation.' Another said,

'This is Ramganga river. It has the faith and recognition more than other rivers.' There are several stories that associate the river with Ram. As one respondent said, 'A fair is organised. It is also God's play. This is Ram's Ganga. It has come out of Shankar's hair locks. This is biggest in all Gangas. This has been flowing since ages.'. 'This fair recreates Ram's crossing the river during his exile. The boatman had stopped the boat carrying Ram here. They were coming from forests of Kashipur. ' Another respondent elaborated on this story.' Ram Ji crossed the river during his exile. Today also Ram crosses the river during the days of Dusshera. He passes through the LalBagh temple during 'Ramleela'. Ram Ji lives here. Even till now, Ram's statue is built and seated in boat to cross the river, as tradition goes.'

The tradition goes that wishes are fulfilled here. And as at Harewali, here too the Ramganga is considered an 'unmarried' river.

◦ **Present perceived status:**

- Pollution key cause of concern. People have seen drastic decline in just one season.
- Decline in flows is also a concern, especially after the Kalagarh dam
- Decline in domestic and ritual use due to pollution. Livelihood use continues.

Within one generation, people have seen a transformation from a 'clear blue' river to a highly polluted one. As one respondent put it, 'Now it is a drain. Earlier the water was sweet and one could drink it. Till 1971 one could catch fish also.

The flow in the river gets stopped because of Kalagarh dam.' Another respondent said, 'Now the filth has increased. Now we can't sit and eat food here like earlier, on the banks of river. The trains that have a stoppage at Katghar station yard also face difficulty. Passengers feel discomfort and can be seen using handkerchief due to stench arising out of garbage.'



This has its impact on livelihoods, as per a respondent, 'Due to increasing pollution and dirt in the river and reducing water flow and levels, all associated livelihood activities have been negatively affected.' The pollution is reflected in the visitors who come to the river, as one

respondent explained, ' The number of people coming in all seasons has come down. And people's participation in religious rituals and ceremonies have also reduced. The changes have been observed after coming up of Kalagarh Dam. People now go to Haridwar.'

Decreasing flows have had their impact on other livelihoods too. Several washermen wash clothes at the river. The dirt in the water has its impact on their work. Paalage is on the decrease.

One respondent voiced concern about the river,' This is our mother, if we don't respect it then we are heading towards destruction'.



One respondent's statement 'If there is water throughout the year in the river, then we also have some security' points out an interesting perspective of people's desire for adequate flows in the river. The residents of Barwalan feel threatened by the people on the opposite bank. They said that there can be theft if the people from the opposite bank can come across easily. The river acts as a barrier and provides them with a sense of security.

- **Livelihoods:** A diverse community in an urban area means that the banks of the Ramganga are home to an array of livelihoods. Earlier the Ramganga was clean, had abundant natural flows, was full of fish and flowed in a silty area. This combination made it ideal for several resource based livelihoods. Primary among these was paalage farming. Fishing was also carried out on a large scale. Bamboo would be floated down the river from Kalagarh for sale in Moradabad. Hosting festivals and providing services to tourists also added to the residents' income. Washing clothes and watering cattle took care of the needs of the residents of Moradabad. With the decline in flows and increase in pollution, all these livelihoods also are on the decline.

In place of these activities which depend on a healthy river, other livelihoods came up. These use the existing water and sands in the river. Several of these such as etching, washing of brass etc tend to pollute the river.

- **Domestic use:** The communities living along the river use the water for domestic uses such as washing, drinking and bathing. This has changed since the last three decades. One respondent said,'The garbage in the river has increased from before and water in the river is less. After coming up of dam, we drank water from river for a few days and then stopped. Now there is only drain water in the river.' Another said, 'Since the last 5-6 years, children don't take bath in the river. Water is also less now.'

Inclusion in flows analysis: Water for domestic use is one of the basic needs of communities. Once the Ramganga satisfied these needs. Since then, people are inconvenienced. The residents' vision of a healthy Ramganga definitely involves being able to use the water for drinking, bathing and washing. These expectations have been included in the analysis.

▪ **Agriculture:**

Agriculture was traditionally practised along the banks of the river. This was almost entirely organic. One farmer graphically described, 'Use of biodegradable waste as compost. Earlier there use to be compost pits where the garbage from the entire city use to be taken there. The water melons grown were so big they didn't fit in the hands.' Even today, people understand some basic principles of organic agriculture. This leads them to value the floods, 'Ganga Ji comes into farm lands and leaves adequate amount of soil.' However as one farmer put it, 'Now It is not in a good state. We have reached a state of unemployment.'

Three factors have contributed to this. The proximity to Moradabad means that the land is valuable real estate, 'Paaleej Farming has reduced. The land under agriculture is sold off. ' Another farmer seconded this, 'We left agriculture some 40 years back, after coming up of dam. Now carry on business. Now agricultural land is being acquired for construction and selling plots.'

The second factor is the increase in pollution. One farmer explained, 'Now we use tubewells. Dirty water flows in our fields.' Another said, 'All activities associated with river have reduced. Agriculture fields and orchards also dry up. Insects also come now. '

The final issue is the high cost involved. As the residents of Barwalan Basti said, 'Earlier, the land at the opposite (left) bank would be used for Paalage farming and agriculture. Paalage farming has been left by many families since 1980 and land area under Paalage has been reducing since then. This is due to heavy expense in terms of tax to land owner (nearly Rs 20000 to Rs 30000), fertiliser, purchase of seeds, labour costs, time, pesticide etc. Estimated cost would come up to Rs 1 Lakh. One had to buy 1.5 to 2 kg seeds for a Beegha of land and there was a risk with the quality of seeds. Irregular flows and danger of flood was another threat. So, largely people shifted their livelihoods from Paalage farming to labour work. However some families still practise it on subsistence level.' According to the farmers on the left bank, 'we now grow cash crop more where investment is less and it pays back more.'

Inclusion in flows analysis: Agriculture was once the mainstay of all the villages in the area. Today, though they cannot longer depend entirely on it, it still provides them with some part of their income. The farmers are extremely vocal about the impact of the change in the flow patterns and the flows they desire. Agriculture has been included in the flows analyses.

▪ **Fishing:**

Fishing has declined considerably in recent years. One respondent said, 'There were so many fishes found in the river that they would be carried in Bullock carts'. Another remembered that, 'Fishes weighing 20-30 kg were found.' Today, said another respondent, the catch is only 5-6

kilograms a season. This was reiterated by another respondent, 'Earlier there were more fishes. Varieties like China, Lachi, Singhara, Chaal could be found. And one could get a good fish catch and income by spending 1 to 1.5 hours on river banks and get a catch of 50 kg. Now drain water and water from mills kills the fishes. Even the people washing clothes face difficulty. Now fish catch is only 3 kg at one time and 15 kg by spending a day.'

The diversity of fish was also very high earlier as a respondent explained, 'Some 30-40 years ago, the water in the river was clean and turtles, tortoise, fishes were found in its water. The fish varieties in this water are Saal, Magora, Laachi, Rohu, Karai, Paththar Chatta, Mahaseer. Gond was the least active fish and Baam fish the most dangerous (had spines in its stomach area)'. A respondent also asserted that 'Some 20-25 years back, numerous turtles and tortoise could be found in river.'

Inclusion in flows analysis: Fish species are dependent on adequate, seasonal, and clean flows. The viability of fishing as an occupation is directly related to fish health and so to instream flows. These have been included in the analysis.

▪ **Rituals:**

The primary cultural activities in the river are, 'Holy bathing in river during festivals and the fair. The fair goes on for 15 days during Ganga Dusshera.' One respondent spoke about the changes in the fair, 'My grandmother tells me that during her times, water use to be blue in color. Now there is no water. If some water is released then it would reduce some level of dirt and filth. We don't take bath but people coming from outside the city do, during the fair. Earlier in the fair, people use to put up stalls of eateries and entertainment during the fair.'

Rituals are now impeded due to the pollution in the river. 'There is clean water in other Gangas. If there is clean water in this Ganga, one can take bath. In other Gangas, one can fill water in palms. Even we fill water from Haridwar and bring it. We don't fill it from here.' One respondent said, 'People don't perform 'Achaman' now- where according to Vedas, water if filled in palms for three times for intake and released for the fourth time back into the river. People come for bathing from other cities. Residents of the city don't bathe in this water.'

Another said, 'The number of people coming for performing rituals as a part of cremation have come down. Now the practice is followed without people's heart into it. (like a formality).' This is also true of the Pruja during Navratri. As one respondent said, 'It is not the same form of Puja that use to happen earlier. Not even like how it does take place in Haridwar. Now we see the sight of not the holy Ganga but of drains.' As a priest said, 'Our livelihood is associated with people's faith. Due to increasing pollution in the river, number of people visiting have come down. Whenever I feel like coming. I perform religious ceremonies at home only now.'

Inclusion in flows analyses: The people working with the temples at Katgarh earn income from the rituals associated with the river. In addition, the fair provides a welcome income boost for several residents, both Hindu and Muslim. These rituals and events are greatly affected by the decrease in flows as well as the pollution. Due to the high number of people associated with the river, this has been included in flows analysis.

- **Bamboo Trade:**

Moradabad did a brisk trade in Bamboo. The poles would be floated down the Ramganga from Kalagarh and Kashipur. The decline in availability of bamboo in these places coincided with the decline in flows and interruptions in connectivity of the Ramganga. Today, said the respondents, 'it comes from Bihar and Assam.'. One of them added, 'The reduction in river flow has negatively impacted bamboo business. Earlier bamboo used to be available at Kalagarh and now it comes from Bihar. We have to spend double the amount in getting the bamboo now. '

Inclusion in flows analysis: The bamboo trade supports several families in the area. Today, the region from which this bamboo is sourced has changed, leading to a loss in profits. The decline in availability of the raw material is a factor that contributed to this, but so is the changed Ramganga. This is a traditional and non-extractive occupation, and so has been included in the flows analysis

- **Laundry:** The dirty laundry of Moradabad comes to the Ramganga to be washed. This has been carried out for generations. Today, the pollution in the river makes this an inefficient and potentially harmful operation. As a respondent said, 'Clothes don't get clean properly in this water and that adversely affects our income.'

Inclusion in flows analysis: Clothes need to be washed, preferably in clean water. The grey water from this activity also needs to go somewhere. Right now, it flows into the river. The present condition where clothes are washed in presumably toxic water, to then pollute it further is clearly not ideal.

However, we would argue that the washermen are as much the victims of poor infrastructural arrangements as the farmers. Neither the water supply system or the sewerage system of Moradabad is such that they would be accommodated elsewhere and the waste water responsibly disposed.

The ideal situation is where the washermen can access clean flowing water from the river, and have the means to treat the grey water before disposing of it. Till then, access to water remains important. Their requirement for near-natural flows has been included in the flows analysis.

- **Cattle herding:** Several small dairies in Moradabad keep cattle. These are brought down to the river to be bathed. One respondent estimated the numbers, 'In river water near Jama Masjid, nearly 2000 cattle is left into the river water everyday. At Krishna Ghat, nearly 1000 animals are left in the water.' The survey team observed about 200 buffaloes led by one man. The practice is for the cattle herders to collect the animals from the various houses and



dairies. They then lead the animals to the river and bring them back every evening.

Inclusion in flows analysis: Cattle herding is a non-extractive occupation that employs several people and increases the city's self-sufficiency in milk. It is important for the health of the cattle, the herders and the consumers of milk. This has been included in the flows analysis.

- **Metal work:** There are several occupations that are carried out under this name near the Ramganga at Katgarh. Nearly all have to do with the washing of products in the river. Perhaps the most toxic of these is the washing of artifacts that have been etched with acid. This effluent is then released into the river.

Less toxic is the washing of *Kanf*. This is the waste matter from the brass factories. The burnt ore is panned in the river and any leftover brass is extracted. The burnt ore makes a compact mass and is used for construction.

Inclusion in flows analysis: These occupations do not necessarily depend on a healthy river and so have not been considered in the analysis. They have been mentioned here to draw attention to the need for a toxic waste treatment facility.

- **Historical flows**

Two assertions made by the respondents describe the river as it once was. One spoke of the quality of the water, 'Earlier water was clean and clear blue in color. People could see the turtles, fishes and coins in the river.' and the other of the quantity, 'The river banks had chains for facilitating holy bathing in the river. There was so much flow in summers that people could drown at the bank.'

- **Summer:** One respondent described the flows in summer, 'The river water was clear and clean in the past. The river banks had chains for facilitating holy bathing in the river. There was so much flow in summers that people could drown at the bank. One could see the fishes and turtles in the river standing from the bridge. The depth at the ghats was 'Upto the 3rd stair from the bottom of the ghat, or about 4-5 feet deep,. Bamboo could easily be floated down the river.

- **Monsoon:** The river rose to completely fill the bed. It reached 'till the upper most step of temple; 10-12 feet'

- **Winter:** The water was several feet higher than in the summer. Respondents estimate, 'more than 3-4 stairs from the bottom step of the ghat'

- **Floods:** Annual floods inundate the fields on the left bank. A respondent said, 'Ganga Ji comes into farm lands and leaves adequate amount of soil.' High floods reach the Manokamana temple in Barwalan

- **Desired flows:**

Residents desire the river that the older generation remembers and talks about. Their primary concern now is for cleanliness. This will enable them to use the water for domestic (including potable) purposes and also allow wildlife to return. In addition, residents also desire the full-

flowing river, or close to it.

- **Summer:** Between 2-5 feet at the base of the ghats, depending on the rainfall the previous year. This will enable bathing. These flows also enable the carrying away of sand and debris as well as being healthy for fish.
- **Monsoon:** Touching the temple or the top of the ghat steps. These flow levels are close to the historic flow levels. They allow for the inundation of the paalage fields.
- **Winter:** Between 5-6 feet at the base of the ghats. This allows for bathing and carrying away of debris.
- **Floods:** According to the respondents, flood waters 'Needs to enter the farms and inundate fields'

7. Flows Analysis for Chaubari:

Chaubari is close to Bareilly, and the seventh e-flows assessment site on the Ramganga as we move downstream. The site is just below a railway bridge. It is also an important pilgrimage site. The river is the popular venue for ritual bathing. More than the occasional pilgrims, the section is a means of livelihood for hundreds of paalage farmers and fisherfolk. This way of life is now going to be extinct. A barrage coming up downstream will soon flood the area.

◦ **Work done:**

Interviews were carried out at the Chaubari cross-section in the first week of June. These dates were selected to coincide with the Ganga Dussehra Mela on 5-6 June. All interviews were conducted at the section, on the banks of the Ramganga.

◦ **Geography:**

Chaubari is located just a few kilometers upstream of Bareilly. Here the river flows across a broad sandy bed. It is bound on either side by embankments. A kilometer or so downstream of the section, the Bareilly Barrage is being constructed.

◦ **Historical/mythological importance:**

Chaubari is a major pilgrim spot near Bareilly. It is a cremation spot as well as a place for ritual bathing during festivals. Its proximity to Bareilly is one of the reasons this spot is preferred for bathing. In addition to this, respondents offered several other reasons for the importance of the river. Some of the stories spoke of the origin of the river itself.

Several respondents equated the name of the river with Rama. When asked about the importance of the river, many simply responded that 'it is Ram's river'. One respondent clarified. 'Ramganga has been brought on earth by Rama.' Another said, 'It is not a river for us. It is Gangaghat. Ram had stayed here when he was ? Ganga came here to pay respect. Since then it is called Ramganga.'

Another school of thought equates it with Parshuram. One respondent explained 'Parshuram was on a pilgrimage . He was thirsty and so drank the water in the river. God told him that he destroyed the Kshatriyas but is now drinking water brought by them. Then Ganga promised him that his name will always be associated with the river.'

People at Chaubari call the river 'Ganga' and attribute to it many of the powers associated with that river. One respondent's statement was fairly typical, 'Ganga is mother for us. It listens to and fulfils our wishes.' Others attributed more specific values to the river. 'Even when its water is stored in a bottle, it does not get infected. It remains

holy. People suffering from leprosy have been coming on the river banks and it is assumed the river water and mere sight of the river can treat the ailment.'

Despite this, there seems to be no confusion between the Ganga and the Ramganga. As one respondent clarified, 'Ramganga is the younger sister of Ganga and has the same virtue.'

◦ **Present perceived status:**

- **Pollution a major source of concern for all groups associated with the river.**
- **Paalage farming, fishing and catering to visitors chief associated livelihoods.**
- **Some sandmining also being done. Barrage is heightening inequities among user groups**

Reduced flows are definitely a concern with both the fisherfolk and the paalage farmers. All spoke of a recent decline in the yields of fish and of paalage harvest. More than the quantum of water, its quality is a matter of great concern. As one respondent said, 'Dependency is not so much on seasonality as on water quality'. However, people also linked the amount of water in the river to the pollution in it. This is reflected in statements such as 'Flow should be there. Only then will the waste not get accumulated'.



Overall, the mood of the people living near Chaubari is despondent. They have seen a decline in the river over the past few decades. One respondent explained, 'Low flows in river and increasing filth has led to less visitors coming on the site now. Earlier more people would come. Water was clean and more. Now some people either go to Haridwar or Kachla Ghat.' The barrage under construction has added to this fear of the future. 89% of the respondents who mentioned the barrage spoke of it with fear. One typical response stated, 'Coming up of the barrage will lead to complete loss of agriculture. Livelihood of 12-13 villages (10000 people) would be affected.'

There are however one group of people who will benefit from the barrage. These are the thirty panda families who have controlled the bathing amenities on the ghats. With the impoundment upstream of the barrage and the promised ghats, they stand to gain from the increased tourist traffic to the area. Even they are troubled by the increase in pollution. According to one, 'All dirty water flows from Bareilly here into the river. Earlier people would come here for cremation rituals. Now they go to Kachal Ghat (Badayun).'

- **Livelihoods:** Chaubari is the site of an astonishing diversity of livelihoods supporting a large number of people. Not just the villages near the site, but those further off are also dependent on the river at this spot for farming and fishing. The place is also a pilgrim spot, with hundreds visiting it for festival baths. However, this is more due to its proximity to Bareilly rather than due to any mythological importance. With increasing pollution, several choose to go to sites further off.

- **Agriculture:**

'Paalage' is the local term for growing melons, cucumbers and gourds on the river bed. The entire land is inundated during 'chaumasa' - the four month of the monsoon. As the floods recede by September-October, local farmers till the land and plant crops that are thirsty and require sandy soil. The river bed provides ideal conditions for these crops, which are harvested by summer. The fields not only offer the only reliable source of a cash income for the farmers, but also define the landscape of the Gangetic plains.



Most paalage farmers do not own the land, but are sharecroppers. Besides giving part of the produce, they also spend on expensive hybrid seed, pesticides, and rent for the truck to carry produce to the market. Often, this seed needs to be purchased several times over when unseasonal floods wash away the seeds or seedlings. After nearly 7 months of work, a farmer sells each 25-kilo sack of cucumbers for Rs 100-180.

'The water that comes from the cities increases our yield' said some of the farmers. The cucurbit and melon farms perform several important functions. They provide the landless poor with a source of income, the urban markets with excellent fruits and vegetables and define the landscape. In addition, they do an excellent job of cleaning the river of its organic waste.

With the farms gone, the polluted water will accumulate above the barrage and convert the lake into a foetid mess. Nearly all the sharecroppers have already realised that they do not have the luxury of depending on only once source of income. But many sharecroppers do not believe they have any real options.

They are faced with the loss of the only remunerative work they has ever known. Most of these farmers also rent another piece of land on which they grow some wheat and rice. This is only for home consumption, and not a full year's worth either. The only option of seeing some money come into the house is by daily labour.



Inclusion in flows analyses: Agriculture was once the mainstay of all the villages in the area. Today, though they cannot longer depend entirely on it, it still provides them with a large part of their income. Some of the families interviewed, especially woman-headed families, continue to depend entirely on paalage farming. According to the respondents, every household in 12-13 neighbouring villages is atleast partially dependent on farming. It also needs to be emphasised that while a few rich and 'upper caste' families own the land, the tilling is done by poor small sharecroppers who are mainly muslim and dalit.

Paalage is unirrigated. It is entirely dependent on the river for both water and fresh silt. High flows inundate the fields and submerge them. This replenishes the soil moisture while also laying down fresh silt rich in organic matter on the fields. As the waters recede, succession sowing of cucurbits is taken up on the newly uncovered soil. Thus paalage farming- and hundreds of families- are dependent on adequate quantum, seasonality, and quality of flows. As one respondent said, Flows should be 3 feet more than current flows for good vegetables. Our profits would get doubled. Very less flows are harmful'. Thus this has been included in the flows analyses.

Fishing:

Fishing is practiced at the site to a great extent by fishermen from the neighbouring villages. The river is teeming with multiple species of local fish. The people living on the banks of the Ramganga at Chaubari practice fishing with a net or line, and only catch enough to get them

through the day. One respondent says, 'A cast of the net gives us a handful of fish for dinner that night. That is enough'. 3-4 casts yield enough to sell at the market.

Inclusion in flows analyses:

Here as in Marchula, when questioned about flows, several respondents mentioned the well being of the fish as the reason for flow levels. People link the flow levels to the health of the fish. In the words of one respondent, 'Good catch for bigger fishes like Lachi and the amount of fish catch also increases. Milankar and Goed lay eggs in the monsoon.' Fish are a crucial source of protein for the farmers in the area. For these reasons, fishing has been included in the flows analysis.

▪ **Rituals:**

Chaubari is a major cremation site as well as a bathing spot. People come from Bareilly to participate in festivals and other rituals. The catering to the tourists is done by 30 panda families who have traditionally controlled the bathing ghats here.

Earlier, they would erect small partitions with grass at the banks leading down into the water. Each such cubicle formed a bathing ghat presided over by a particular family. Today, the grass partitions have been replaced by plastic, but the system remains.

Devotees go to the ghat operated by the family priest. The ghat provides a safe place to keep clothes and valuables as well as to change after bathing. Any puja that needs to be done is also carried out. Afterwards, the devotees pay the priest a fee in both cash



and a mixture of rice and dal. The primary beneficiaries of the bathing ghats are these 30 families, but there are also several hundred other people involved in providing other services to the visitors.

These include the sale of puja material and prasad, toys, sweets and vegetables grown in the nearby fields. Interestingly both hindu and muslim farmers participate in selling these items to the visitors. Other services include auto rickshaws and tangawallahs for transport. Some people, faced with the decline of agriculture, have purchased

Inclusion in flows analyses: The residents of the villages around Chaubari earn considerable income from the rituals associated with the river. In addition, the river provides a welcome space for the residents of Bareilly. These are greatly affected by the decrease in flows as well as the pollution. As one priest said, 'Low flows near ghats and in river and increasing filth has led to less visitors coming on the site now. Earlier more people would come. Now some people either go to haridwar or Kachla Ghat.' Due to the high number of people associated with the river, this has been included in flows analysis.

◦ **Historical flows**

Respondents were asked to describe the flows as they recalled them a generation ago. All the respondents reported a decrease in the quantity and quality of flows. In the words of one respondent, 'Water on the ghats use to be double of present day flows. Water was as transparent as glass. Discharge of untreated Sewage from drains of the city opening into river should be stopped.'

- **Summer:** All respondents mentioned a visible decrease in the flow at present as compared to before the Kalagarh dam was built. They described the flows in terms of width of the river and said that three decades ago, it extended across nearly the entire length of the bridge, till the first pillars on either side. Some other respondents described it in terms of quantum as well as width. One response was, 'Before dam came up, the water in the river was more, use to flow till the last pillar. It use to be 3-4 deep running water.' This was echoed by another farmer, 'Due to reduction in flows and amoun of water, agriculture has been affected. Earlier river was broad. Water more double the current amount. After coming up of Kalagarh dam, it has become bad.'
- **Monsoon:** All respondents asserted that the water filled the entire plain upto the embankments. Other than the fisherfolk, most people do not access the river much at this time. The fishermen report catching larger fish during the monsoon.
- **Winter:** As during the summer, the water in the winter touched the first pillars of the bridge on either side. The water also was clean, clear and with 'good velocity'.
- **Floods:** Floodwaters touched the top of the embankments. The paalage farmers appreciate that it earlier brought in fertile silt. Floods did not occur every year three decades ago, this is a recent phenomenon. Another change is that of pollution. According to one respondent, 'Earlier even the flood water was light almond colour.'

◦ **Desired flows:** After describing the present and historical flows, the respondents were requested to describe what flows they would consider most appropriate for the river at certain times, and why. In most cases, respondents desired flows were very close to the historic flows. However, a major point of contention was the pollution. Nearly every respondent mentioned the pollution. In some cases, it was nostalgic with people mentioning that they would come to the river and cook khichidi using the river water. Some are much more aggressive; one respondent said 'People still drink it, bathe in it calling it a holy river- when it is a dirty nala.' Several respondents demand that the cities upstream be stopped from polluting the Ramganga saying, 'All city drains open in the river. This discharge of dirty water should be banned'



▪ **Summer**

As per historic flows. Most respondents, both farmers and pilgrims, requested water between 3 to 4 feet deep close to the banks. Most of the constructed ghats extend about 5-7 feet into the river channel. It is understood then that the pilgrims want the required depth of water at this distance from the banks. In addition, most people demanded that the water not be stagnant, but have a velocity that will still enable them to bathe safely while carrying away dirt.

▪ **Monsoon**

Here too, the respondents want flows corresponding to the historic levels. This means that water should extend across the flood plain upto the top of the embankments. This saturates the soil with water and also lays down new soil which improves the productivity of paalage farming

▪ **Winter**

As per historic flows, when the river was wide enough to extend under all the pillars of the railway bridge. Here, water extends across the river bed, but the flood plain is dry. This enables paalage farming. 'There should not be sudden releases of water' cautioned one respondent. At present there are times when untimely floods wash away the farmers' investment in seed. Another respondent spoke about the pollution, 'Water was so clean and transparent that one could see the sand on the river bed. The river image should still be like that. '

- **Floods**

Desired floods are the same as the historic monsoon levels where water extends across the flood plain upto the top of the embankments.

8. Flows analysis for Dabri:

Dabri is the last selected section along the Ramganga. Here the river flows through a broad sandy plain dotted by villages. As in other sections, paalage farming and fishing is carried out. The villages around the section are accustomed to living with floods. In addition to resource based work like farming, people also undertake crafts such as zardozi and carpet making.

- **Work done:**

Interviews were carried out at the Dabri cross-section in the first week of July. A PRA was carried out at Mau Shahjehanpur between 26-28 October. This village was selected because it had a good representation of both Hindus and Muslims. In addition, the interviews revealed that unlike at Dabri, the women here also visited the river.

- **Geography:** It is just some 20 kilometers upstream of the Ramganga's confluence with the Ganga. Despite this, the respondents still attest that they are subject to the impact of Kalagarh dam. They have learned to live with floods, and recollect the several shifts that their village has made over the years. The river here flows through broad sandy plains, and paalage farming is prevalent.

- **Historical/mythological importance**

The proximity of this section to the Ganga is detrimental to the extent to which it is revered. One respondent informed us, 'We do not worship Ramganga. Ganga Ji holds more importance and is more sacred'. Another respondent explained that it was merely a matter of proximity, 'Ramganga is worshipped in Bareilly. It is close there. Here Ganga Ji is close so we worship her.' That said, people still give some importance to the river as their existence depends on it, 'If it dries then we will suffer losses. '

- **Present perceived status:**

- Pollution key cause of concern.
- Decline in flows is also a concern, especially after the Kalagarh dam
- Decline in live and ritual use due to pollution.

People see a decline in the quality of the flows, as well as the quantity. In addition, the floods have increased their velocity. One respondent summed up the status of the river, 'Rivers do not have depth now. River keeps on changing its course. Its water is diverted in canals. This time rain water flows in the river. So water is ok. One does not come to know about the garbage, dirt and filth. In Summers, they release dirty water from drains. There were more fishes. '

People are also unsure about sudden releases. One respondent explained, 'Now more floods

occur. Water is released suddenly. I don't know from where and why though. We don't go and take bath in river even in summers. '

- **Livelihoods:** Before a ban was imposed on sand mining, sand would be taken from river for all months except flood period. Rains are less due to deforestation, which is leading to lowering of ground water levels. Even sand mining is banned now from this year itself. We used it earlier for raising the ground level of our house to prevent during conditions of flood. Time would be spent in labor earlier. Now that is prohibited.

- **Agriculture:**

Agriculture was traditionally practised along the banks of the river. Paalage and farming still remains an important part of peoples' livelihoods. Sowing of Paalage crop starts in the month of November and harvest is done in May- June depending on arrival of monsoon and floods. Months of expense extend from Dec to February and income is attained by the month of June. Flows released from Kalagarh dam leads to 'floods' even in the non-monsoon period i.e. month of March. This damages the sowed crop and losses in livelihood associated with Paalage crop. Paalage is also affected by changes in the velocity of floods, 'Paaleej crop (melon, water melon) is reducing. Now the same sand does not come with the flood water. It is more coarse now, not fit for growing crops.' This has led to a decrease in lucrative crops as one respondent said, 'Now floods bring more of silt and sand in them. Earlier new soil would come in which Arhar and Chana could be grown. Now in this soil, it is not possible and tubewells are also needed now.' Another respondent emphasised this by saying, 'less intense floods are necessary to maintain the moisture in soil.'

Wheat is grown in the fields that are away from the floodplains. Some people also grow chana and peas. Irrigation from river is required during preparation of wheat crop from October until the month of February. This has decreased due to pollution. A respondent explained, 'Water is red in color and dirty. This has led to people depending on tubewell and boring.' Speaking of the changes in agriculture, one resident explained, 'Earlier floods would recede in 4-5 days. Crop productivity and soil quality would be better. Earlier cow dung manure was used.'

Human-animal conflicts are also leading to a decline in agriculture. One respondent said, 'Number of bluebulls have increased. Police does not permit to kill them. Now eucalyptus is grown in our fields as well. It caters to industries in Lalkuan Ply and paper mills in Baajpur and Rudrapur.'

Inclusion in flows analysis: Agriculture was once the mainstay of all the villages in the area. Today, though they cannot longer depend entirely on it, it still provides them with some part of their income. The farmers have been affected by the change in the flow patterns. Agriculture has been included in the flows analyses.

- **Livestock rearing:**

Several people keep cattle in the area. According to them, 'Milk production would not be

possible if river is not here. We take our animals in the river for bathing. They would remain thirsty if river goes dry.' However several other respondents said that their animals do not drink this water, but only bathe in it.

Inclusion in flows analysis: Cattle herding is a non-extractive occupation that employs several people and increases their income. Visiting the river is important for the health of the cattle. This has been included in the flows analysis.

- **Fishing:**

Fishing in the river is done in all the months except monsoon (June, July, August). Natural floods occur in months of June-July. One respondent explained the process, 'Fish varieties- Rohu, Bhainsani, China, Gaunch, Nairen, Laachi, Goraiyya. Bumchuk, Mahseer comes only when water from Dam is released. Earlier there were more fishes and were sold at the rate of Rs 20 per kg. Now there are less fishes and sold at the rate of Rs 200/ kg. The size of fish of a particular variety has also reduced. Number of Crocodiles have also reduced. '

Pollution is affecting fish health. As one respondent said, 'Only people from 'dhimar' clan would catch the fish earlier. Dirty water flows in the river. This kills fishes. So, now everyone catches the fishes easily. The number of people fishing has gone up.' The effects of consuming this poisoned fish needs to be examined, especially since the fish is also sold. As one respondent said, 'Fishing on tender basis by government. Camp is organised. 'Bhatiyare' people do fishing. 20-2 people come. They later sell the fish in Bareilly and Lucknow. '

Inclusion in flows analysis: Fish species are dependent on adequate, seasonal, and clean flows. The viability of fishing as an occupation is directly related to fish health and so to instream flows. These have been included in the analysis.

- **Rituals:**

Women and young girls visit the river during the 'Raksha Bandhan' festival. Cremation is also carried out on its banks. This is the main source for carrying out rituals during cremation. If one has the money, one goes to Ganga.

Inclusion in flows analyses: Though fewer rituals are practised here as compared to a place like Moradabad, they are still important to the people living there, who have no other place to go to. This has been included in flows analysis.

- **Historical flows**

People remember a clean river with adequate flows. Boats would earlier ply along the river, and people would drink the water.

- **Summer:** 5-6 feet deep close to the banks and varying between 10-15 feet in the centre
- **Monsoon:** Water increases till the river is nearly a kilometer wide
- **Winter:** Varies between 4-10 feet along the cross-section

- **Floods:** Floods reach Ullapur village. Occasional floods stand 1m high on the road
- **Desired flows:**

Residents desire the river that the older generation remembers and talks about. Their primary concern now is for cleanliness.

- **Summer:** Same as historical flows. 5-6 feet deep close to the banks and varying between 10-15 feet in the centre. This maintains the groundwater levels, allows animals to drink the water and allows space for fish. Boats can also ply across.
- **Monsoon:** Should be filling the river bed, but within its confines except for occasional floods. Untimely flooding of the paalej fields causes great losses.
- **Winter:** Same as historical flows. Varies between 4-10 feet along the cross-section. This maintains the groundwater levels, allows animals to drink the water and allows space for fish
- **Floods:** Floods need to be less intense, the velocity not enough to damage the houses, but needs to stand in the fields to a depth of one foot This makes the wheat fields fertile. Without this inundation, the fields do not bear much as the soil is sandy. According to the respondents, 'This land has abundance of sand content. So some floods are necessary for good wheat. It is good if it stays'

E. Present, Desired and Reference State of the River Ramganga

Responses were invited from a wide range of people at the sites. Interviews often yielded information regarding groups of people carrying out certain livelihood practices near the river. These groups were consciously sought out for interviews. The attempt was to include as many different occupations and rituals around the river as possible. The various groups of people consulted at each site have been detailed in the flows analyses along with information about why the flows required these occupations were included. In some cases, the occupations did not have a specific flows requirement, but they have been mentioned in the relevant section to create a comprehensive picture of the various activities around the Ramganga.

A summary of all the livelihoods described is below.

Activity	Description	Sites encountered
Agriculture	Largely on the decline. Main crops observed: rice, wheat, sugarcane. Earlier: maize, pulses.	Bhikiyasain, Marchula, Afzalgarh, Harewali, Agwanpur, Katgarh, Chaubari, Dabri
Fishing	Largely for personal consumption. Some communities also catch fish for sale. Forms an important part of community traditions	Bhikiyasain, Marchula, Afzalgarh, Harewali, Agwanpur, Katgarh, Chaubari, Dabri
Sandmining	Potentially harmful. Earlier done on a small scale, but commercial mining has increased. Most activity seen near Bhikiyasain and	Bhikiyasain, Afzalgarh, Dabri

	Afzalgarh	
Rituals	Predominantly hindu rituals carried out at nearly all the sites. Some are site-specific, most, such as cremations and mundan, follow hindu traditions.	Bhikiyasain, Marchula, Afzalgarh, Harewali, Agwanpur, Katgarh,Chaubari, Dabri
Recreation	Swimming and recreational fishing predominate. Besides this, several people at all sites recommended visiting the river bank for a walk. This has not been included as this activity does not have specific flow requirements.	Marchula
Domestic use	This use of the river water for washing, drinking and bathing is only found in the most polluted section. In rural areas people tend to use groundwater, either accessed through springs or handpumps.	Katgarh
Bamboo Trade	Bamboo poles would be floated down the Ramganga from Kalagarh and Kashipur.	Katgarh
Laundry	The dirty laundry of Moradabad comes to the Ramganga to be washed for generations.	Katgarh
Cattle herding	Most rural communities keep cattle and bring them down to the Ramganga. This is usually considered a part of agriculture. In Katgarh, cattle herding is a discrete activity.	Katgarh, Dabri
Metal work	This includes washing of products, straining of Kanf, and washing of acid-etched goods	Katgarh
Paalage farming	'Paalage' is the local term for growing melons, cucumbers and gourds on the river bed. It is practised on a small and ever-declining scale from harewali downstream, but emerges as a separate occupation at Chaubari	Harewali, Agwaanpur, Katgarh, Chaubari

In addition to striving for the inclusion of all these groups, efforts were also made to ensure proportional representation by gender and religion. Peoples' memories of the historical flows were obtained during interviews and also during PRAs. The PRAs enabled us to access collective memories and stories. Information about desired flows were also obtained during both the interviews and PRAs. These flows were obtained both by asking direct questions and by the information volunteered by respondents while describing their occupations, rituals and lifestyle.

Table 1- Reference flows – Normal year

Site	Normal year Summer	Normal year Winter	Normal year Monsoon	Normal year Floods
Bhikiyasain	Flows twice that of present summer flows. Broad channel with low velocity except in riffle areas. Waist deep near centre except for deep pools	Flows two-three times present winter flows. Water deeper than height of residents	River fills the river bed, reaches top of present retaining wall on left bank. Depth much more than height of residents	Floods regularly extend across the floodplains. Occasional high floods reach the market road
Marchula Bridge	5 feet deep at ford with some very deep pools	slightly more than summer flows, about 6' deep with pools	Fills the river bed to 3' height on the right bank	Water touches bottom of the bridge
Downstream of Afzalgarh barrage	4-5 feet near the banks to more than 10' in the central part. Was narrow and deep.	7 feet. Was narrow and deep.	About 25 feet deep, and touching the sides of the bed.	Touched bottom of bridge, which was 35' above the bed
Downstream of Harewali barrage	Waist to chest deep	From chest deep to above head	Rain would only stand in fields for a couple of hours. The river bed would be full, but no stagnant pools	Flooding would only occur for 2-4 days. The fields would be submerged, to about 1km from the river
Agwanpur	Varies from waist deep water to upto the chest.	Above chest upto head level	Touches the cemetery just outside the town	Water enters the fields upto the cemetery or just beyond it. During peak years, floods enter the basti
Katghar Railway Bridge	Upto the 3 rd stair from the bottom of the ghat, or about 4-5 feet deep	Above 3-4 stairs from the bottom step of the ghat	Till the upper most step of temple; 10-12 feet	Inundates fields on left bank and lower part of Barwalan Basti on right bank.
Chaubari	Till the last pillar of the bridge	Till the last pillar of the bridge	Covers the flood plain upto the embankment	Inundates Paalage fields on right bank. More frequent, deposits sand
Dabri	5-6 feet deep close to the banks and varying between 10-15 feet in the centre	Varies between 4-10 feet along the cross-section	Water increases till the river is nearly a kilometer wide	Floods reach Ullapur village. Occasional floods stand 1m high on the road

Table 2- Reference flows – Drought year

Site	Drought year Summer	Drought year Winter	Drought year Monsoon	Drought year Floods
Bhikiyasain	Broad channel with low velocity except in riffle areas. Knee-deep near centre except for deep pools	River extending across river bed. Depth much more than height of residents	River extending across river bed. Depth much more than height of residents	Floods cover the flood plains
Marchula Bridge	2-3 feet deep at ford, pools remain	slightly more than summer flows with pools	fills the river bed.	Covers the flood plain
Downstream of Afzalgarh barrage	About 3' and more than waist deep in the central part	5-6 feet	About 15 feet deep	About 25 feet deep, and touching the sides of the bed.
Downstream of Harewali barrage	Knee deep to waist deep water	Waist to chest deep.	The river bed would be full, but no stagnant pools, and no standing water in fields	Flooding would only occur for 2-4 days. The fields would be submerged, to about 1km from the river
Agwanpur	Knee deep to waist deep water	Chest deep	Enters the fields	Upto the fields
Katghar Railway Bridge	Touching the bottom stair of the ghat	Upto the 3 rd stair from the bottom of the ghat, or about 4-5 feet deep	covering the ghat steps	Inundates fields on left bank
Chaubari	Till the last pillar of the bridge	Till the last pillar of the bridge	Covers the flood plain upto the embankment	Upto the fields
Dabri	3-3.5 feet near the banks	3 feet near the banks with some deep parts	Water increases till the river is nearly a kilometer wide	Floods extend over fields till Uillapur

Table 3 – Desired Flows – Normal Year

Site	Normal year	Normal year	Normal year	Normal year
	Summer	Winter	Monsoon	Floods
Bhikiyasain	same as historic flows	Water touching the edges of the river bed	same as historic flows, i.e filling the river bed upto top of retaining wall	Filling the floodplain
Marchula Bridge	Current flows satisfactory	Current flows satisfactory	Current flows satisfactory	Floods should be less. Else get cutoff
Downstream of Afzalgarh barrage	Around 5 feet. Prevents stagnation	Historical levels. 7 feet deep	Historical levels. About 25 feet deep, and touching the sides of the bed.	Floods should be less. Traumatized by 2010
Downstream of Harewali barrage	Want free-flowing water with good velocity. Stagnant water causes illness in cattle.	Need natural flows. There was no standing water in winter then. Water flowed with good velocity with depth ranging from knees to above the head.	Want pre-dam flows. These were close to natural. Floods would flow down and not stay in the area. Damage was less	
Agwanpur	Around waist deep but with water above head in the deepest part. Groundwater is replenished	Chest deep. This replenishes fields, is good for the fish and allows pumping.	As per historic. Now floods are more intense. Historic floods did not damage houses.	As per historic. Now floods are more intense. More bed scouring now. Historic floods did not damage houses.
Katghar Railway Bridge	4-5 feet at base of ghats. To wash away accumulated waste. Maintain aesthetic value	To wash away accumulated waste. 5-6 feet at base of ghats	Touching the temple	Needs to enter the farms and inundate fields to bring in new soil
Chaubari	As per historic flows. Waist deep at the bathing area will enable farming	As per historic flows. Water extends across the river bed, but the flood plain is dry. This enables farming. There should not be sudden releases of water	Water should extend across the flood plain upto the top of the embankments. This saturates the soil with water and also lays down new soil. This makes paalej farming possible	Water should extend across the flood plain upto the top of the embankments. This saturates the soil with water and also lays down new soil. This makes paalej farming possible

Dabri	Same as historical flows. 5-6 feet deep close to the banks and varying between 10-15 feet in the centre. This maintains the groundwater levels, allows animals to drink the water and allows space for fish. Boats can also ply across.	Same as historical flows. Varies between 4-10 feet along the cross-section. This maintains the groundwater levels, allows animals to drink the water and allows space for fish.	Should be filling the river bed, but within its confines except for occasional floods. Untimely flooding of the paalej fields causes great losses.	Floods need to be less intense, the velocity not enough to damage the houses, but needs to stand in the fields to a depth of one foot for 20-25 days. This makes the wheat fields fertile. Without this inundation, the fields do not bear much as the soil is sandy.
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Table 4 – Desired Flows – Drought year

Site	Drought year	Drought year	Drought year	Drought year
	Summer	Winter	Monsoon	Floods
Bhikiyasain	depths between 2-7 feet across the channel	Water touching the edges of the river bed	Filling the river bed	60% of flood plain
Marchula Bridge	Current flows satisfactory	Current flows satisfactory	Current flows satisfactory	Floods should be less. Else get cutoff
Downstream of Afzalgarh barrage	3-4 feet	Historical levels. About 5 feet deep	Historical levels. About 15 feet deep	Floods should be less. Traumatized by 2010
Downstream of Harewali barrage	Want free-flowing water with good velocity. Stagnant water causes illness in cattle. Water around knee deep	No submergence of land in winter. Flowing water, a little more than summer	Want pre-dam flows. These were close to natural. Floods would flow down and not stay in the area. Damage was less	Fields submerged for a couple of days. No standing water for long periods of time.
Agwanpur	Around knee deep with water upto chest in the deepest part to prevent damage to pumps	Between waist and chest deep. This is the historical level. It replenishes fields and allows pumping.	As per historic. Now floods are more intense. Historic floods did not damage houses.	As per historic. Now floods are more intense. Historic floods did not damage houses.
Katghar Railway Bridge	2-3 feet at base of ghats	2-3 feet at base of ghats	Touching the top of the ghat steps	Needs to enter the farms and inundate fields
Chaubari	Water near the ghats needs to be sufficient to enable a dip in the water. Water should also be clean	As per historic flows. Water extends across the river bed, but the flood plain is dry. This enables farming.	Water should extend across the flood plain upto the embankments. This saturates the soil with water and also lays down new soil. This makes paalej farming possible	Water should extend across the flood plain upto the embankments. This saturates the soil with water and also lays down new soil. This makes paalej farming possible
Dabri	Atleast 3 feet close to the banks. This allows animals to drink water. Without this water, animals will die.	Atleast 3 feet close to the banks. This allows animals to drink water.	Within the river bed.	For the same reasons as stated in the 'normal year' water needs to stand in the fields to a depth of one foot for a minimum of 4 days.

Table 5 – Present Flows – Normal Year

Site	Normal year Summer	Normal year Winter	Normal year Monsoon	Normal year Floods
Bhikiyasain	Half of flows in summers 40 years back. Below knee at centre to 1-1.5 feet at banks. Half the historic width	Flows two-three times present summer flows. Waist deep	River fills the river bed, reaches top of present retaining wall on left bank. Depth much more than height of residents	Floods regularly extend across the floodplains. Reaches houses (KMVN guest house). Occasional high floods reach the market road
Marchula Bridge	3 feet deep near banks with some very deep pools	slightly more than summer flows, about 4' deep with pools	Fills the river basin with water reaching resort in 3-4 continuous rain	Water touches bottom of the bridge
Downstream of Afzalgarh barrage	2-3 feet at banks. Is now wider than before.	3-4 feet (half of historic flows)	About 25 feet deep, and touching the sides of the bed.	About 35', overtopped barrage in 2010, 1-1.5km spread of river
Downstream of Harewali barrage	Stagnant water causes illness in cattle. No flow can be seen.	Less water now, barrage is closed. Usually water is diverted into the canal, but there are sudden releases in river. This is when maintenance in canal is needed. Walking in fields, water gets released, they need to stay in fields.	Fills the basin. Water stays in field for longer than earlier. Now more water seen in monsoon. More stagnant pools. No outlet for water since big floods.	Floods have doubled since barrage. Also stands all monsoon. Standing water of 1-3 feet depth in the village/ fields

Agwanpur	3-4 feet deep near banks (waist deep). Sudden releases washes away sugarcane. Wider than before	4 feet deep at banks	Above a person's head. Spreads from 1 - 1.5 km	Spreads from 1 - 1.5 km. and Floods covers fields. Peak floods reach houses in town
Katghar Railway Bridge	Near last stair of temple, but more released during Ganga Dusshera (2-3 rd stair of temple)	Near the bottom step of the ghat	Till the upper most step of temple; 10-12 feet	Inundates fields on left bank
Chaubari	Half of flows in summers before Kalagarh Dam. Knee deep to waist deep (releases increase at the time of festivals)	Knee deep to waist deep	Enters the fields. Fills the basin	Till both the end pillars of the railway bridge
Dabri	Crossable river - 3-4 feet		Till the normal width of the river, almost 1 km	15-20 feet, spreads upto Hullapur village

Table 6 – Present Flows – Drought year

Site	Drought year Summer	Drought year Winter	Drought year Monsoon	Drought year Floods
Bhikiyasain	One - third of flows in summer 40 years back	Flows two-three times that of present summer levels, which is some where around knee deep	River extending across river bed. Depth much more than height of residents	Floods cover the flood plains
Marchula Bridge	1-2 feet deep near banks, pools remain	slightly more than summer flows with pools	fills the river bed.	Covers the flood plain
Downstream of Afzalgarh barrage	About 1'- 1.5' to 3-4 feet at centre	2-3 feet	About 15 feet deep	Water reachhead upto the cemetery
Downstream of Harewali barrage	Flows regulated. No water in summer. Also not sure when releases are done	Less water now, barrage is closed. Usually water is diverted into the canal, but there are sudden releases in river.	Now more water seen in monsoon. More stagnant pools. No outlet for water since big floods.	Floods have doubled since barrage. Also stands all monsoon.
Agwanpur	2-3 feet (knee level)	3-4 feet deep at banks	Above a person's head. Spreads from 1 - 1.5 km	Spreads from 1 - 1.5 km. More bed scouring.
Katghar Railway Bridge	Near last stair of temple, but more released during Ganga Dusshera (2-3 rd stair of temple)	Near the bottom stair of the ghat	covering the ghat steps	Inundates fields on left bank
Chaubari	Half of flows in summers before Kalagarh Dam. Less width (reduced by a 100 -200 meters) than before	Knee deep to waist deep	Enters the fields. Fills the basin	Till both the end pillars of the railway bridge
Dabri	Less wide than before. 400 meters		Till the normal width of the river, almost 1 km	15-20 feet, spreads upto Hullapur village

F Conclusions:

The present study on the Ramganga assesses flows requirements for the purposes of satisfying the cultural and livelihood requirements of the people that depend on it. In doing this, it builds upon a study done earlier by the same team on the Ganga, which was the first ever attempt at quantifying cultural flow requirements.

The most crucial difference between these two studies hinges on the great reverence that Hindus have towards the Ganga. This perception of 'sacredness', of its being a Goddess rather than a river dominates all discourse around the river. The renaming of the Ministry of Water Resources to include the phrase 'Ganga Rejuvenation' is an illustration of how the worshipped river dominates conservation efforts and policy in the country.

The Ramganga is richly diverse in the communities that inhabit its banks. This enabled the team to understand and include opinions from a wide range of people (including Hindus, Sikhs, Muslims, Buksas, Dhimals etc) engaged in a wide range of activities (including worship, farming, fishing, collection of grasses etc).

The Ganga study had two different teams working on the assessment of flow requirements for satisfying cultural and livelihood expectations. It was perceived that the two were not separate requirements, but displayed several connections that deserved to be explored in greater depth. The combination, in this attempt, of cultural flows and livelihood flows into the single component of 'socio-cultural' flows enabled this exploration of these interconnections.

In addition to the use of participant observation, semi-structured interviews and group interviews, this study included five Participatory Rural Appraisal exercises to better understand the dynamics between the various user groups and the river.

The study was able to understand, document and in some cases quantify, the relationship that these various groups have with the river. This relationship includes extractive and non extractive use of the water in the river, harvesting and use of the flora and fauna in and around the water, worship, inclusion in folklore and art, and an affinity that prompts people to protect the river. The study demonstrates that this near-symbiotic relationship with the river where people living in its vicinity both depend on it for their sustenance, empathise with it, and undertake to protect it transcends boundaries of religion or nature of livelihood.

The river is extremely modified and has been so for nearly five decades. The present generation therefore has only known a modified and unpredictable river. Despite this, peoples' collective memories have preserved both an image of the river as it was before being dammed, and a record of the flow regimes of this non-disrupted river. The architecture, agricultural systems and stories all record this information and pass it down the generations. An interesting aspect of this is that the desirability of these historical flows have been inherited as well as a picture of what those flows were. The baseline for peoples expectations of the river thus is not the modified river, but

is the free-flowing Ramganga.

An uncorroded baseline, a group of diverse peoples still bearing affinity to a river as it was before being dammed, and the certainty of an improvement in the ecological health of the river and the well-being of these peoples with a return to near-natural flow regimes, provide strong arguments in favour of environmental flow releases for all rivers .

Annexure 1 : PRA at Kamedua, Bhikiyasain

28 June to 02 July 2014

PSI Team: Ajay Kumar, Bhuvan Joshi, Neha Khandekar, Chicu Lokgariwar



PRA-Process

The PRA process started on the 28th of June when a reconnaissance of the villages Kamedua and Sabuali was performed in the evening. An informal conversation happened between people from both the villages and PSI team. A villager briefed the team of facilitators about the current scenario in the villages. After Kamedua, the team walked towards the Sabauli villages via the Shiv temple. At the temple, the team found a few men who informed about a Puja that would be performed the day after.

The team reached the temple the next morning i.e. on 29th, where they met the newly elected Pradhan and some other



men from both the villages. A transect walk was performed along with those men to Kamedua village. After another round of discussion with people in the temple later that evening and looking into the interest and participation of villagers and repo with PSI team, it was decided that PRA would be conducted in Kamedua. PRA was conducted on the 1st of July. The tools used during the exercise were social mapping, resource mapping, seasonal mapping, timeline analysis, participatory census and wealth ranking. The participatory analysis performed by the villagers of their village was presented in the form of maps and diagrams drawn on charts by the PSI team on the 2nd of July.

Analysis of Timeline:

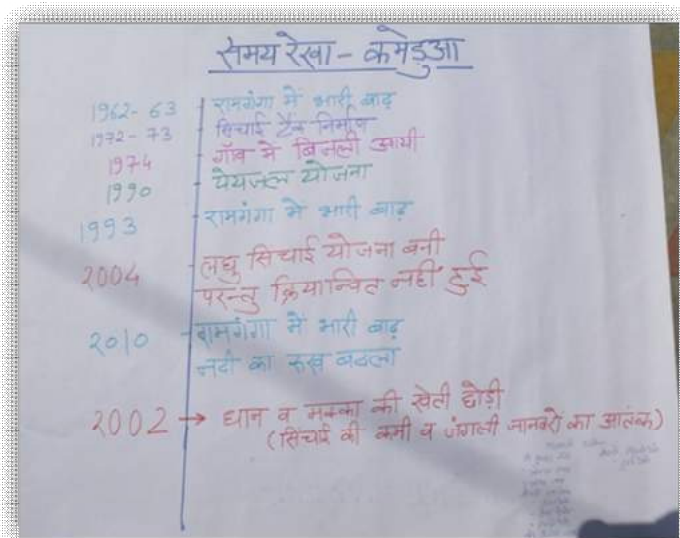
Ramganga is a river that largely does not fluctuate a great deal. However, after a certain span of time, there have been recurrent floods in the monsoon. The most recent were in 2010, 1993, and 1962-63. Since the pumps have been installed in 1990, there has been increased disturbance in the river. When the pump-house was built at the confluence of the Ramganga and Gagas, there was considerable excavation in the river bed. Before this, the Ramganga flowed on the bank opposite Kamedua. The monsoon after the pump-house was built, it shifted to Kamedua and caused a lot of destruction.

The people of Kamedua believe that their forefathers are among the ganas (disciples) of lord Shiva. They have a right to the proceeds of all offerings made to Shiva. They are also very fond of bathing in the river after temple rituals. These two reasons led the people of Kamedua to settle in their present spot.

Since Kamedua has been settled, the people have been using the river water for drinking and other domestic uses, for watering their livestock, and for creating ropes out of Bhimal. The river is also used for fishing. However, at no point has water from the river been used for irrigation.

People also approach the river for cultural functions such as ritual bathing of idols, puja, and cremation. There is also a mela at the triveni sangam held on the occasion of Shiv Ratri. However, the mela has been attended by fewer people these days.

If the monsoon is late, the women of the villages around Bhikiyasain take part in an unique function. After a Yagna, they carry water from the river up to the Shiva temple and pour it on the Shivling. There is a passage by which this water flows back downhill towards the Ramganga. The process of pouring water on to the Shivling is continued till the water flows in a continuous stream from the temple to the river. If the water reaches the river, it is understood that the rains



will arrive soon.

Analysis of Time trend:

The irregularity of rainfall has been increasing in recent years. Since the flows in the Ramganga depend on the rainfall, the level of water in the river has also been fluctuating in recent years. When this fluctuation moves towards an extreme, it causes damage to the villages.

In 1993 and 2010, this extreme led to damage to Kamedua's fields and orchards. Some fields were totally washed away while others were covered with sand. This drastically decreased the amount of land available for agriculture.

In addition, the irregularity of rainfall led to a decrease in the productivity of fields as more than half of the fields are unirrigated. Simultaneously the population also increased which decreased the land holding with each family. This meant that each family had both smaller holdings, as well a lesser amount of produce per unit of land. All these factors combined to make agriculture unviable. The 1990s also saw an increase in outmigration.

समय के साथ बदलाव - कमेडुआ

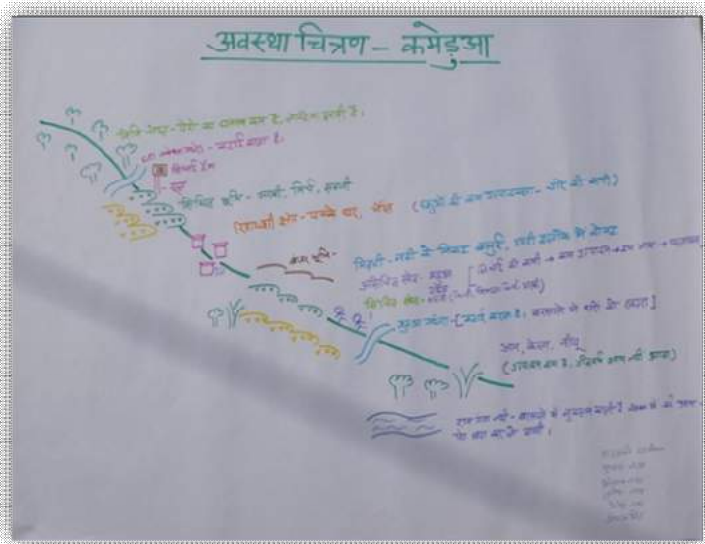
वर्ष	बारिश का स्तर	जमीन का स्तर	जनसंख्या	परिवार
1950	//////	~~~~~	✓✓✓✓✓	-
1960	//////	~~~~~	✓✓✓✓✓	-
1970	//////	~~~~~	✓✓✓✓✓	-
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2000	//////	~~~~~	✓✓✓✓✓	○○○○
2010	//////	~~~~~	✓✓✓✓✓	○○○○
2013	////	~~~~~	✓✓✓✓✓	○○○○

समय के साथ बदलाव - कमेडुआ

Analysis of transect walk:

The transect walk was from the point at which the path from the Shiv temple enters the village to the village boundary upto the origin of Dhara Gadhera (tiny rivulet).

Two streams flow through the village. One of these, the Dhara Gadhera is perennial while the other is called Sherua gadhera and is seasonal. The spring from which this originates had a discharge of 5 litres per minute at the time of the transect walk. The streams join the Ram Ganga.



There are 10 houses in the village, all of which are pucca. It was observed that some households have buffaloes. Some fields are below

The fields near the village are irrigated, while those near the fields are rainfed. Irrigation is through the medium of a pukki guhl (lined field channel) from the gadhera. The fields in the periphery of the village were barren with heavy lantana growth. The density of trees in the private forests is low.

Analysis of Resource map :

[illegible][illegible]

The fields close to the river were once fertile, but have become less productive since the river shifted to the bank close to the river. Now annual flooding has rendered these fields sandy. The fields closest to the river have been entirely abandoned.

Analysis of seasonal map :

According to it, grains and onions are the main Kharif crop, besides some vegetables. Leafy

greens and potatoes form the Rabi crop.

Flows predictably are lowest in May and June and at their peak in August and September. Fishing, on the other hand, is at its peak in the summers. This culminates in the Dahau festival in the end of summer.

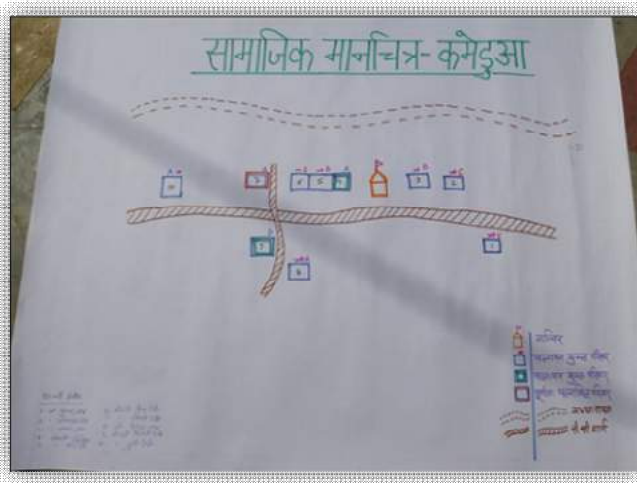
Discussions during the creation of this calendar provided an insight into the quantum of fish that is harvested from the river. The households fish in the river about twice a week during the summer holidays (May and June) and about once a week in the months of February, March, April, and July. This translates to about 32-35 visits during the year. During each visit, they claim to catch not less than 3 kilos of fish, which at the current prices translates into Rs.20,000 annually.

Analysis of social map and participatory census :

The participatory census and the social mapping were carried out simultaneously. The exercises revealed information about the households, primarily a high level of migration. Of the 10 households in the village, 8 households had atleast one member outside the village. In several cases, the entire younger generation had moved to urban areas. Three households were classified as 'poor', whereas one was so badly off that the participants insisted on a new category of 'extremely poor' only for them.

ग्रामांगी जनगणना - कभैडुआ
ब्लॉक - सूड, तहसील-भिकियासैण, जिला- अल्मोड़ा

कुल परिवार -	10	मरुधन	गाय - 01
कुल जनसंख्या -	70		मैस - 07
महिला -	33		बकरी - 12
पुरुष -	37		रकबा - 03
पूर्णतः पलायित परिवार -	01		
पलायन युक्त परिवार -	07		
(हलाकर दे दे)			
पलायन युक्त परिवार -	02		
पलायित [महिला -	13		
पुरुष -	24		



Annexure 2 : Report of Participatory Rural Appraisal at Village: Parmawala

Site: Harewali

Date: 9 and 10 October 2014

PRA Team: Chicu Lokgariwar, Neha Khandekar, Ravindra Singh

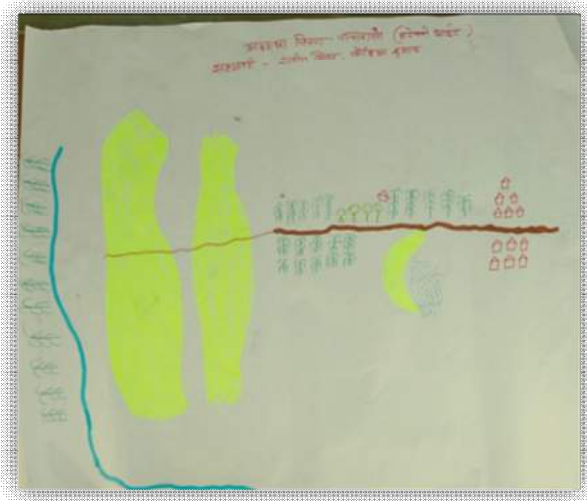


PRA process:

Parmawala and Shahajahanpur were the two villages downstream of the Harewali barrage. Of these, Shahajahanpur had an entirely Hindu population and were on the old channel of the river. Parmawala had a population of both Hindus and Muslims. The people also practice a variety of professions that are related to the river.

The PRA team met the Pradhan and informed him about the PRA process and goals. We were advised to meet a doctor in Parmawala who would help us with the process. We met him and several other people the day before we planned to have the PRA. Since several villagers work as labourers and leave the house early, we were advised to split up the PRA activities as per their schedule.

Accordingly, we began at six in the morning in the



village 'chauraha' which was the meeting place for everyone. The PRA was again taken up as people returned from the fields. The tools used were timeline, seasonal calendar, time trends, transect walk, and resource mapping. Separate meetings were carried out for the men and the women in the village. Charts created during the PRAs were discussed and then put up on the wall in the village.

Analysis of the PRA

Transect walk:

A transect walk was carried out from the village to the river bank on the 9th October. It began from the a chauraha which was pointed out to us as an ideal place for the PRA activities. This is the spot where people gather before starting for labour or agriculture work. The village has brick paved roads, with most houses being constructed of brick and concrete. There are a few houses that are roofed with thatch. The day we visited was the day of the Govardhan puja, when small idols are created of mud and cowdung and decorated with grass blossoms. These are then thrown into the fields.

Immediately beyond the village, the sugarcane fields start. Harvesting of the cane was in progress when the PRA was conducted. In addition to harvesting the cane, the farmers also go to the fields to collect the leaves to use as fodder.

On the left of the path we took down to the river, a couple of hundred metres from the village is a flooded area with sand deposits. This marks the level to which the monsoon waters had reached this year. After this are more sugarcane fields interspersed with poplar cultivation. So far, there seems to be no eucalyptus plantation in the village. Some fields near the river belong to people from the village across the river. One such person has built a house where he and his family stay during sowing and harvest.

After the sugarcane fields, the sand banks of the Ramganga start. There is no paalage on this bank of the Ramganga, though there is some on the opposite bank. To reach the river, one needs to cross an older channel where the Ramganga flowed a few years ago. The wooly necked stork was seen during our transect.

Resource mapping:

The village is situated just below the Harewali barrage. It is located on the right bank of the Ramganga, and encompassed by a nala which might be an old channel. The areas immediately below the barrage are not cultivated, but used for fodder. Cultivation is largely confined to the area between the village and the river. Presently, the main crop is of sugarcane.



Flood water enter the village inundating it entirely. On the left bank also some inundation takes place on land where paalage is carried out. That land however is cultivated by people from other villages. Downstream of this area, considerable sand deposits occur every year.

During monsoon, water stands in the village for 2-3 months. Water flows between 1-2 kilometers inland from the river banks on the right bank during that period.

Timeline and timetrend:

The village's memory goes back to 1900 when there was a monumental flood. At that time, the village had been newly steeled. After that, they experienced floods large enough to displace the village four times (1951, 1960, 1965, 1970). in this period, maize, rice and dals were largely planted.

In 1971 the barrage was built and the first sugarcane was planted. A few years later in 1978, another flood came. Here, the magnitude and duration of the flood led to large scale migration. About half the village migrated out that year. An epidemic following the flood devastated the rest of the village.

The first tubewells were sunk in the early seventies. Six handpumps were installed for domestic water around this period at depths between 25-35 feet. Of these four stopped working in a year.

Subsequent major floods happened in 1985 and 1995. Increase in silt and land erosion due to intense floods in the latter half of the nineties led to the adoption of poplar.

In 2010, the flood caused major damage and the death of one young man. Two families also migrated away from the village.

Seasonal calendar:

In addition to the crop calendar for Paalage, rice, sugarcane, and wheat, the PRA exercise also provided information about rituals, labour work and irrigation.

The highlight of the festivals in the village is the ganga mela that is held on the banks of the river every year in November. This is held on the left bank of the river and earlier the women of the

Year	Event / Practice
1950	Maize, Rice, Dals
1960	Maize, Rice, Dals
1970	Maize, Rice, Dals
1980	Maize, Rice, Dals
1990	Maize, Rice, Dals
2000	Maize, Rice, Dals
2010	Maize, Rice, Dals
2014	Maize, Rice, Dals

Year	Event / Practice
1900	Maize, Rice, Dals
1951	Maize, Rice, Dals
1960	Maize, Rice, Dals
1965	Maize, Rice, Dals
1970	Maize, Rice, Dals
1971	Barrage built
1978	Maize, Rice, Dals
1985	Maize, Rice, Dals
1995	Maize, Rice, Dals
2010	Maize, Rice, Dals
2014	Maize, Rice, Dals

village could visit the mela every year since monsoon floods would recede by November. However, since the barrage was built, late releases from the dam have prevented the women from participating in the mela some years.

From December to April, several villagers work as daily wage labourers. Most of this work is done on the nearby commercial farms.

Irrigation using groundwater is carried out in the summer from March to May. Some irrigation is also carried out in November and December.

वर्ष	जन	फेब	मार्च	अप्रैल	मई	जून	जुलै	अग	सप	ऑक्ट	नोव	डिसे
मेल्या	✓	✓	✓	✓								✓
पलेल			मिनास मि.								✓	
खान							सेवारी				कारि	
गाना	कारि	म.	डर्रा	म.ड.								कारि
गेहू	ड.			कारि								डर्रा
मम्मा												
मोरिंग			मिनास मि.	मि. मि.							मि.	मि.
सि सि											मि. मि.	मि. मि.
अरहर												

Annexure 3: PRA at Village Kunwa Khera Village, Bijnor District, Uttar Pradesh (Afzalgarh cross section site)

31st Oct and 2nd Nov, 2014

PSI Team: Ajay Kumar, Chicu Lokgariwar, Neha Khandekar

At Afzalgarh Barrage cross section on Ramganga River, village Kunwa Khera was chosen for conducting the Participatory Rural Appraisal. The village is populated by Sikhs and Buksa tribals. It is situated on the river banks and people are engaged in farming and sandmining. Some fishing is also carried out.

Initial visit and discussions:

A transect was conducted on the 31st of October in the village. The PSI team reached at Pradhan's house. Mostly, the houses looked scattered and within one's own private fields, as also told during discussion at his house. Team left the house with probable site and time for PRA, which was also confirmed at two consecutive informal discussions. Walking across houses and fields with crops like sugarcane and rice, the team reached another household. There a broad discussion was carried out on present scenario, history of settlement of the Sikh community in the area, the association of people's lives with Ramganga River and purpose of conducting the PRA. With further agreement on day and site of PRA within the village along with informing other villagers about the exercise through announcement from 'Gurudwara', PSI team walked back.

On the morning of 2nd November, PSI team along with the participants from the village gathered at Kanya Secondary school. The PSI team introduced itself and the research objectives. Government in future may plan newer programs or policies related to rivers and projects on Ramganga River. In such scenarios, local riparian communities should be involved in any decision making regarding the rivers, because of the association of their lives with the river for generations. Villagers also have an association with the river with respect to the 'traditional livelihoods' (two or more generations) like agriculture, fishing. To involve people within this research, their perspectives have been recorded at various other cross section sites along the river, and same is being done at Kunwakhera village.

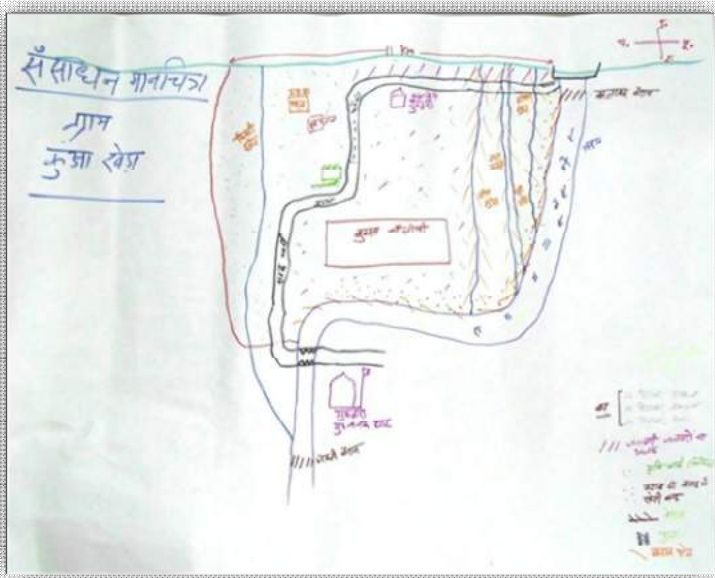
The participants got interested with the introduction and it was told that this is an attempt to record their perspectives and take their voices forward in the best possible manner in the form of a report. It was made clear that facilitators (PSI Team) was not there to deliver anything whatsoever. But a possibility of some action generated in near or far future can't be denied.

Analysis of Resource map:

River Ramganga is marked as a prominent feature in the map. It is shown to flow southwards downstream Kalagrah Barrage along the village before it takes a turn westwards. It passes the

Gurunanak Ghat Gurudwara before reaching Harewali Barrage site. The village Kunwakhera is at a distance of 11 km westwards from Kalagarh Barrage. But main Kunwakhera is the settlement of 'Buxa' (a scheduled tribe) community with 70-75 households. 'हम बस मेहमान हैं' said one of the participants indicating that they settled on the land much later than the Buxa tribe.

A couple of seasonal streams run parallel to the river - major ones out of those are marked on the map - namely 'Kikari' on one side and 'Neem', 'Hathiya', 'Joodi' and 'Nalkatta' on the other side of the Buxa settlement. Out of these 'Kikari' and 'neem' streams are highlighted as the most notorious ones, causing maximum damage during monsoon. Erosion and land cutting happens because of lack of 'Bandha' and 'Pucca' road.



The meeting site i.e. the school is indicated between the 'Kikari' stream and 'Kuchcha' road to the village. The 'Kuchcha' road also referred as 'Kalagarh Marg' is the road from Kalagarh Barrage to the village leading to the 'Pucca road' within the village and Gurudwara Gurunanak Ghat.

‘गंगा मैय्या भी नहीं बक्श रही’

The land near the river is not fit for agriculture due to cutting and sand deposition by the river. Farming on this land stopped after the 2010 floods, depositing stones on the land. Paalage is not practised at all. Private handpumps and boring machines are used for irrigation presently by some farmers. Attack by wild animals like bluebills, pigs etc in the field is common. They come from Uttaranchal and visit the area because of drinking water sources (streams).

Analysis of seasonal map:

Fishing is done in all the seasons. The main livelihood of the Buxa community and main dependence on the river is in the form of fishing. The Dam in the river is seen as an obstruction in the fish coming downstream. From the barrage in Bhagota village (Harewali), a small fish (*Moile*) migrates upstream. Apart from that, *Singha* and *Bhatt* are other fish varieties found in the river. Most of them do not own lands for agriculture so they rely on fishing for all the 12 months.

Grass for roof tops and wood collection is collected by people of Buksa tribe in the months of September and October. Sand from the river is obtained in all months except monsoon. However sand mining using JCBs has affected the labour work that was available to Buksa tribe.

मौसमी चित्रण

	अ	ब	दि	ज	ज	अ	स	म	जु	अ	सि
मछली	=	=	=	=	=	=	=	=	=	=	=
द्वार दास	=	=	=	=	=	=	=	=	=	=	=
रेता काजरी	=	=	=	=	=	=	=	=	=	=	=
संस्कृति	=	=	=	=	=	=	=	=	=	=	=
मछली मछली	=	=	=	=	=	=	=	=	=	=	=
मछली मछली	=	=	=	=	=	=	=	=	=	=	=

Cultural association does not involve holy bathing or worshipping per se but at the banks of the river, people offer flowers after cremation. However a fair during *Gururanak Parv* is held in months of November during which some people from Sikh religion go and take bath in the river. Buksa tribe celebrates *Nahan* Fair at Ganga and perform rituals like 'Mundan' and cremation at its banks.

Agriculture and labour work (Buksa tribe on farms of Sikh farmers) keeps people engaged in all the months except September and October when people are waiting for crops to get ready. Rice (*Dhaan*) sowing is done in the month of July (before monsoon), wheat is sowed in November and sugarcane in February. Dhaan is harvested in months of Oct-Nov and wheat in April.

Fodder grass is grown by Sikh farmers and Buksa tribe buys it from them for their cattle. The activity of growing and harvest is from the months of June- October.

Analysis of Time trend:

History- The village got settled in 1960s. Livelihoods associated with the river earlier also involved sieving gold from its waters.

The barrage construction started in 1960s and got completed in 1974. The river flows were reduced to a large extent after that. People remember continuous flows in the river in 1950-60. When compared with a stream in Kotdwar, some villagers remarked that Ramganga flows for all twelve months in a year, unlike a seasonal stream 'ये

वर्षाव

वर्ष	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
1960	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
1970	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
1980	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
1990	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
2000	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
2010	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव
2011	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव	वर्षाव

तो बारह महीने चलती है'. The right bank of the river was broader and continuous in monsoon with Nalkatta stream. Historic monsoon flows had river flow upto an extent of 4km in width as compared with present flows in the same season.

The village suffered major damage in the form of lives lost and effect on agriculture in the 1978 and 2010 floods. Two lives were lost in 1978 floods while 2010 had severe impact on livelihood. 2010 have been registered as the most severe floods in people's memory. The 2011 floods could be controlled and thus had lesser impacts.

This also led to out migration from the village, mainly from 'Khadri' or lower area in the village for labour work. At least 10-15 families migrated to nearby areas. The reason for floods is attributed to carelessness of management authorities related to dam.

Sand mining has always been practised. Earlier there would be open tenders but presently it has reduced. Some removal of sand for local usage is not bad for river and should be allowed.

Fishing is practised by people from 'Buxa' tribe but that has also decreased over time. The dependency and association of lives within the area and river, thus exists in the form of obtaining sand for building houses locally and fishing by Buxa people.

Earlier agriculture would be rain'-fed and there was less investment than now. This in turn affected the crop cycle and pushed a change in the crop pattern. Crops grown earlier were Maize, Masoor, Chana, Lai, wheat and mustard. Sugarcane until then was only for self consumption for making jaggery. In 1990 Sugarcane, Dhaan (rice) and wheat became major crops. They have more return in terms of monetary investment made in agriculture. At this time, Eucalyptus and Poplar cultivation also started. Sugarcane is supplied to the mill but money is not paid on time.

Animal rearing has reduced because of restricted entry into the Corbett reserve area since 1980. Animals visiting the forest would eat good quality nutrient rich grass and would produce more milk.

Water quality in the river also deteriorated with increasing silt content and iron contamination in drinking water sources. People would visit the river for drinking water and cloth washing etc. After Dam construction, tap water supply came into the village under the Mayawati Government.

Annexure 4 : PRA at Barwalan Basti, Moradabad (Katghar Bridge cross section site)

29th, 30th October, 2014

PSI Team: Ajay Kumar, Chicu Lokgariwar, Neha Khandekar

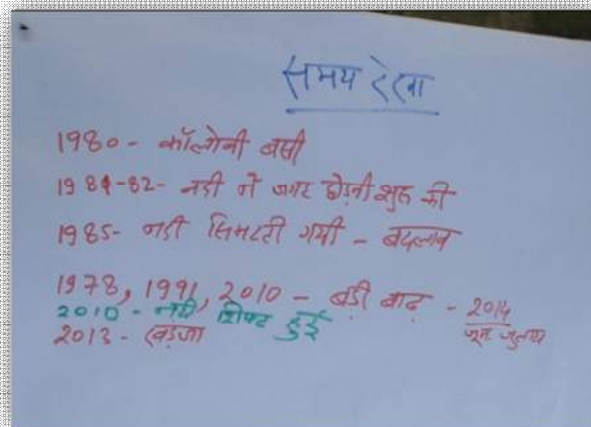


PRA-Process

The PRA meeting at Moradabad was conducted at Barwalan Basti (settlement) near the Katghar Bridge on banks of River Ramganga.

Analysis of Timeline:

The newer settlement in Barwalan got established in 1980. Around 1981-82, river shifted its course and moved away from the settlement, i.e. towards the right bank. The width of the river kept reducing since 1985. Major floods recorded in participant's memory are in the year 1978, 1991, 2010 and in 2014. 2010 is also the year when river changed its course, again. The 'Kharanja' or brick road came in the village in the year



Analysis of Daily Routine:

The launderers wash clothes from early morning to early afternoon. Washing of brassware is also done at this time. Both men and women engage in Paalage farming near the river banks from morning till evening.

पुरुष	महिलाये
4-6 बोलू निमालना	4-6 बिया जहाने
6-12 बील्ले छोना	(रबि, दोन)
प्रः 5- 6- पालेन (पालेनवाले)	प्रः 5- 5 - पालेन
प्रः 4- 12 बजे कपू छोना (छोनी)	
प्रः 7- 9 नोक	
प्रः 6- सुन 5 मल्ली पकाना	

‘बाढ़ में गंगा जी आती हैं और हमारे घर को
पवन करके चली जाती हैं’

The settlement is on the banks of Ramganga in the city of Moradabad. The land use near the river is mainly for grazing, sand mining and to some extent Paalage farming. The right banks has the Barwalan settlement, which was also the meeting site for the PRA.



Ganga Dusshera festival is celebrated and a fair is held on the banks of the river around the months of June. Nahan fair is organised near Diwali sometimes around the month of November. Rituals like 'Mundan' 'Áchaman' and cremation are carried out at her banks. Culturally newly married couples are also taken at the river for prayers. 'जीवन के साथ जुड़ी हुई है. मरना

ओरंगी चिठा											
आ. नं.	अ. नं.	दि.	ल.	क.	ख.	ग.	घ.	च.	पुनः	नि.	वि.
सौकरिक गतिवागि	✓✓	✓	✓✓	✓✓					म.आ.प. म.प.		
	म.प.		म.प.						✓✓		
आपसी (प.प.प.)	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓	✓✓		
ल. नं. म.प. म.प. म.प.									✓✓	✓✓	✓✓
वा.प.	✓✓								✓	✓✓	✓✓
म.प. म.प.	✓✓	✓✓	✓	✓							✓
	✓✓	✓✓									✓
वा.प.	✓	✓	✓	✓	✓	✓	✓				
	✓										
म.प. म.प.	✓✓	✓✓	✓✓	✓✓							
	✓✓	✓✓	✓✓	✓✓							
म.प. म.प.	✓✓	✓✓	✓✓	✓✓							
	✓✓	✓✓	✓✓	✓✓							

जीना इसी नदी पे है'. Shops during such fairs are run by people from Muslim community.

Fishing is done mostly in months of October and November i.e. just after monsoon. *Lachi* and *Karai* fish varieties migrate from downstream to upstream and mahseer from upstream to downstream. The release from the mills around the months of November-December kills the fishes.

Sand mining from river is done in all months except monsoon. There is a threat of epidemic and spread of diseases like malaria from the river in the months of monsoon.

Analysis of Time trend:

The river use to flow near the Manokamna Temple at Barwalan. It has shifted its course again after the 2010 floods. The main channel is on the left bank now. Post the construction of Dam upstream, water is being extracted and supplied via canals to Rajasthan. This has reduced the flows in the main river. Since the newer settlement, river has been shrinking and moving away. 'नदी सिमटती चली जा रही है'. Flows are increased at the time festivals like Ganga Dusshera and Kartik Fair.

Year	Location / Event	Flow Status / Notes	Year	Location / Event	Flow Status / Notes
1976	नदी	पार्लेज	नदी के पानी	बाद	1978 में बड़ी बाढ़
1980	पुराने स्थान मानिकाना	जहाँ पानी होता था	सन् 1980 से पार्लेज के पानी कम हो रहा है	1991 में बड़ी बाढ़	
1990	भिरौली धर	"			
2000	वर्तमान स्थान की लफ	नदी के उमड़ते पानी के धक्के से पानी धीरे-धीरे नदी सिमटती चली जा रहा है			
2010	वर्तमान जगह पर	नदी का पानी सिमट चुका है			

‘नदी में पानी २४ घंटे रहे तो सुरक्षा भी

रहेगी’ points out an interesting perspective of people’s desire for adequate flows in the river. The residents of Barwalan feel threatened by the people on the opposite bank. They said that there can be theft if the people from the opposite bank can come across easily. The river acts as a barrier and provides them with a sense of security.

In 2010 floods, water had entered the settlement and filled the houses till the roofs. Guava orchards of some people got washed away in these floods. In 2014 floods, people had evacuated their houses for 8 days. 17 people died during this flood. Another flood year in the history was in 1978. Police makes announcement in case of danger of

Location / Event	Water Quality Status	Notes
नदी के पानी की गुणवत्ता	नदी में पानी	सुरक्षा
निरन्तर जगह	✓	बाढ़
हो रही है	✓	निरन्तर
है	✓	बाढ़ ला
	✓	है

floods now in the area.

River water has become dirty now. This is affecting the wildlife in the river. Earlier, tortoise could be seen. This has now decreased. Even the birds visiting the river have reduced now. Low flows and deteriorating water quality has also had impacts on cultural and religious activities at river bank. Its water causes irritation in the skin and eye.

Changes in activities associated with the river

Sand mining from the river and near its banks has been increasing. However presently there is a ban on this activity.

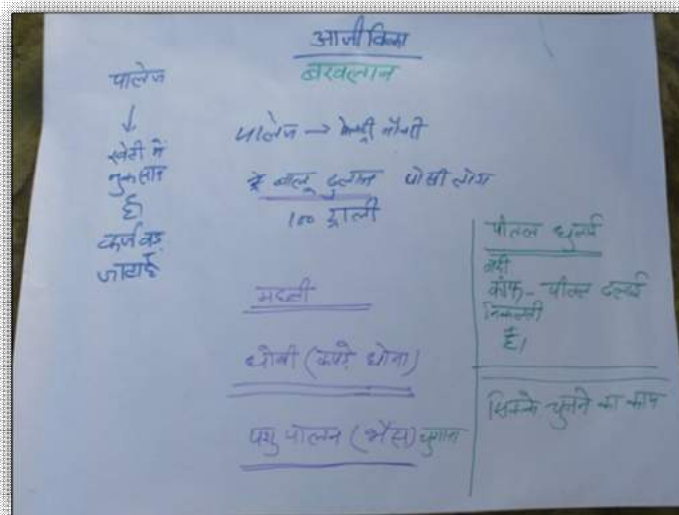
Earlier, the land at the opposite (left) bank would be used for Paalage farming and agriculture. Paalage farming has been left by many families since 1980 and land area under Paalage has been reducing since then. This is due to heavy expense in terms of tax to land owner (nearly Rs 20000 to Rs 30000), fertiliser, purchase of seeds, labour costs, time, pesticide etc. Estimated cost would come up to Rs 1 Lakh. One had to buy 1.5 to 2 kg seeds for a Beegha of land and there was a risk with the quality of seeds. Irregular flows and danger of flood was another threat. So, largely people shifted their livelihoods from Paalage farming to labour work. However some families still practise it on subsistence basis.

Livelihoods associated with the river

‘Ghosi’ community depends on sand mining from river. They also earn by getting goats and buffaloes for grazing near the river and buffaloes for drinking and bathing in the river water. They may earn Rs 40 a day for goats and Rs 100-150 for buffaloes (upto Rs 1500-2000 in a month) depending on the distance and number of animals in a group. Shops during the fair held at the time of festivals are run by Muslims.

Washermen practice cloth washing on ‘ghats’ at the river banks. Washing brassware is also done along with brass extraction from soil bought from factories.

They buy a truck full of soil from the factories which can cost upto Rs 5 lakh. After the metal extraction – the remaining mud is also sold off at the rate of Rs 3-4 per kg. Coin collection is also done from the river. (Livelihoods associated with River Ramganga in Barwalan, Moradabad)



‘गंगा मैय्या मिट्टी देके जाती हैं’

River also provides soil for 'लिपाई' meaning a mud layer for flooring and walls in *Kuchcha* houses.

Annexure 5 : PRA at Mau Shahjahanpur village, Shahjahanpur (Dabri cross section site)

Dates - 26 Nov to 28 Nov, 2014

PSI Team: Ajay Kumar, Chicu Lokgariwar, Neha Khandekar



PRA-Process

The PRA at Dabri cross section site was conducted in the village Mau Shahjahanpur. This village lies at a distance of around 21 km from Farrukhabad District. The motorable distance between parallel flowing Ganga and Ramganga is near about 11 km. However each PRA exercise is different in itself, this village was chosen over the other villages surveyed to maintain the gender and religion balance of the participants. During the surveys it was realised that most women do not visit the River in Hullapur village whereas Dabri village consisted of only Hindus. Mau Shahjahanpur had women visiting the river and people from both Hindu and Muslim religions. The villagers would be participants and PSI team as facilitators during the following exercise spread over a period of two days. A transect within the village was performed with some villagers on first day of the visit. The walk started from Pradhan's house till the river and back.

Analysis of transect walk:

जादा हैं, नुक्सान कम'. A Primary school

[illegible]

When talking about association with the river, some again expressed the problems that villagers face due to ban on sand mining as they would use that sand for raising level of house as a measure for flood protection. Next stop was a Hindu Fisherman's house. Muggers were seen occasionally, earlier, near the river banks. There was a mention of building a '*bandha*' to stop water and use of buckets to prevent overflow. This house was visited earlier during the surveys also. The walk then resumed and via the Neem, Eucalyptus, Mulberry trees; a mix of Kuchcha and Pukka Houses- often raised above the ground level by sand for flood protection; walking on

brick road (*Kharanja*) with open drains on either side; the group took a right and a left turn to reach an area with agricultural field (sugarcane) on one side and ‘*Purana Gaon*’ (Older village/ settlement) on the other side. This was divided by a drain created by river during floods. This is from where it had entered the village in the past, as pointed out by participants.

‘नदी का कोई वजूद नहीं है’ sums up the acceptance of river changing its course by villagers. The settlement was close to the river earlier but people moved as per river changing its course and came to the current location of the village. ‘अब नदी में उतना ज़ोर नहीं है’ spoke someone from the group, describing the river, while the team stood gazing at the river channel. ‘Earlier water would come with more pressure’ was linked to diversion of water upstream, near Bareilly, for supply to canals. So ‘the river does not flow to its full capacity’. The secondary channel of the river can be seen after walking for around 200 meters. And a piece of land covered by sand and often used for paalage crop divides the secondary and main channel. This is overtopped during heavy rains. ‘The road bridge on the river could be seen further downstream from there.

On the left bank is the village, under Shahjahanpur District and on right bank falls the villages coming under Farrukhabad district administration.

Men in some houses were spotted engaged in what was being referred to as ‘*Zari ka Kam*’ (intricate embroidery work with decorative pieces of metals). There were at least three to four permanent shops selling local snacks and sweets (especially because visit was around the festive season). In one house, a boat was spotted and when inquired, villagers said that it was distributed by the government for flood protection.



PRA process

‘Why is there a ban on removing sand from our own fields? There should be a ban on major sand mining from banks and river bed.’ The initial round of discussions on day two started with an older and much talked about topic. PSI team took another walk within the village to inform villagers about the meeting.

PSI team started with giving an introduction about the institute. It is important to include people in research and decision making regarding local natural resources – in this case river Ramganga. Hence, apart from individual surveys, a need was felt for initiating a thought and discussion amongst local riparian communities and their association with the river. This, as a prime

objective for the meeting, was reiterated in front of people gathered for meeting. The exchange of knowledge about river would be mutual, since locals living in the area for generations would know the river better. The study on this river involves researchers from other disciplines, to understand the river and its functions in its entirety. PRA as an exercise, by drawing maps and figures on the ground would be useful in drawing the relationship of people with the river. The river both benefits people - in the form of Paalage farming or fishing or local sand use for flood protection; and floods like the 2010 causes damage in the area.

Change in the flows and course of river is a regular phenomena. The village was situated at the present location of the river. It moved from there as a result of floods, some 100 years back. Now the river has changed its course again, coming closer to the village and cutting the land. The villagers said that they often go to take bath in the river. 'हम हर समय नदी में ही रहते हैं' remarked



the villagers. The amount of water in river is not the same any more. Sand farming, starting in the month of November, has also reduced. 'The river water is for free..so it is traded and sold to a company'. The exact reason for reduction in amount of water in the river is not known but participants speculate extraction from river upstream of their village.

Constraints- All the PRA exercises have been conducted with time constraints to spend enough time in the research area to understand the social fabrication, limited participation from within the area. Also PRA in Mau Shahjahanpur had lesser participation from older people and women. It was also later realised that living within the area for sometime and observation based notes would have made the research robust.

Analysis of Daily Routine:

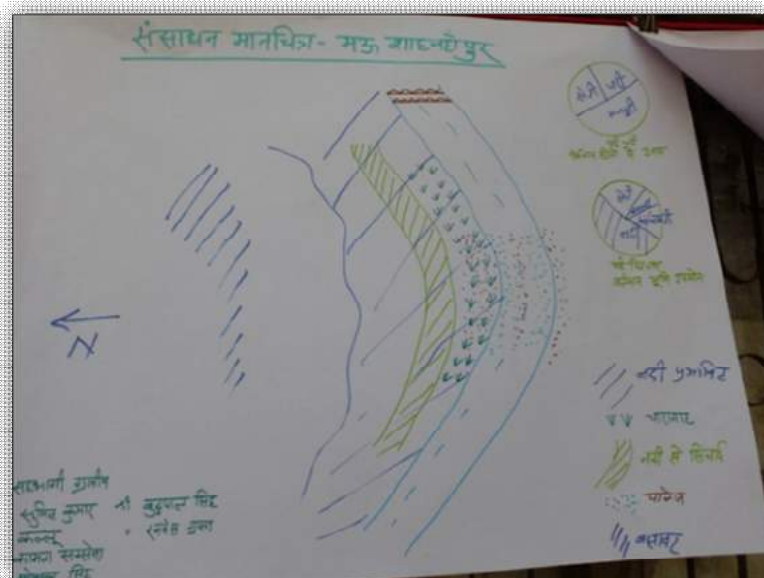
Fishermen start visiting the river since early morning. Most villagers have

दैनिक दिनचर्या					
	प्रातः ५-८	सुबह ८-१२	बैठक १-३	शाम ४-६	रात
पुरुष	सर्दी ३०२	✓	पादलेन ५८५	पादलेन ५८५	पादलेन ५८५
	वसस	✓	X	X	X
महिला	सर्दी	तेरी प्रसन्न	लकी लाना	रोटी पादलेन	
	गमी				
	वसस				

toilets. Only 25% people go for open defecation on river banks. During the day, animals (cattle) are taken to the river for bathing and drinking water. Water is also pumped from river by some for irrigation. In summers men spend almost the entire day in the field for guarding their Paalage fields. In winters they go for Paalage harvest, again for the entire day. Women visit the river banks mostly either for wood collection or taking food for the men from the family in the fields.

Analysis of Resource map :

The Ramganga River was drawn as a prominent feature with road bridge on it. The Mau Shahjahanpur village was indicated on left bank of the river. The settlement on right bank of river falls under Farrukhabad district whereas the village and settlements on left bank comes under Shahjahanpur district. The river keeps changing its course every year. Paalage farming is done on land where it deposits the sand, on either bank, or on the island in middle of the river.



Livelihood Pie chart – The main sources of income within the village is from Agriculture, Zari work and labour. Half of the income comes from labour work while rest half involves equal monetary contribution from agriculture and Zari work.

Land use Pie chart – River flows more than half of the land area. Rest of the 40% of land has agriculture and settlement.

Analysis of seasonal map:

Sowing of Paalage crop starts in the month of November and harvest is done in May- June depending on arrival of monsoon and floods. Months of expense extend from Dec to February and income is attained by the month of June. Fishing in the river is done in all the months except

मौसमी चित्रण - मऊ शाहजहाँपुर

महीना	जनवरी	फरवरी	मार्च	अप्रैल	मई	जून	जुलै	अगस्त	सितम्बर	अक्टूबर	नवम्बर	दिसम्बर
पावसाळ (mm)	10	20	30	40	50	60	70	80	90	100	110	120
तापमान (°C)	15	18	22	25	28	30	32	35	38	40	42	45
वर्षा	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
बर्फ	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
सिंचनी (जो के)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
पतना	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
मछली पकड़ना	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
अन्य काम	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
वेटिंग	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

नोट: 1. सड़क ब्रिज 2. शाहजहाँपुर जिला 3. फर्रुखबाद जिला 4. मऊ शाहजहाँपुर

monsoon (June, July, August). Flows released from Kalagarh dam leads to ‘floods’ even in the non-monsoon period i.e. month of March. This damages the sowed crop and losses in livelihood associated with Paalage crop. Natural floods occur in months of June-July. Boats were used before bridge was constructed across the river. Before a ban was imposed on sand mining, sand would be taken from river for all months except flood period. Grasses (*Paatel*) growing near river find usage for making roof tops and as fodder. Irrigation from river is required during preparation of Wheat crop from October until the month of February. Culturally, women and young girls visit the river during the ‘*Raksha Bandhan*’ festival. Cremation is also carried out on its banks. This is the main source for carrying out rituals during cremation. If one has the money, one goes to Ganga.

Paalage farming related activities starts from the months of May until the month of November. Irrigation from river is carried out in the months of October to February for wheat. Fishing is done in all seasons except monsoon and mainly in post monsoon months. Floods occur not only in monsoon but sometimes even in October due to sudden releases by the dam. People extract sand from the river in all months except monsoon.

Analysis of Timeline:

The village has shifted several times due to floods in the river. People got settled in 1910. ‘*Purana Gaon*’ older village had already been there. It came under Farrukhabad district until 1913, after which administration came under Shahjahanpur district. The bridge across the river was built in 1976-77. Before that boats would be employed to cross the river. In 1978, village was hit by floods that washed away the agriculture land close to the river. Around 1990 a shift in the cropping pattern occurred from Pulses and sesame to wheat.

Some people in Mau Shahjahanpur are involved in embroidery work on clothing as a means of livelihood where they do not have to migrate outside the village. Such ‘*Zari*’ (embroidery with golden metallic motifs and small strands) started in 1985-1990. Another floods hit the village in 1998 causing damage to agriculture land. Pumping from the river for irrigation also started within the same year. From the year 2000, eucalyptus plantation and use of hybrid seeds in Paalage farming started. A new crop called ‘*Mentha*’ or ‘*Shiwala*’ got introduced in 2007-08. The 2010 floods were the most severe of them in people’s memory in the village and some remarked that floods (sudden high releases) occur every 3 to 4 years.

Analysis of Time trend:

The village has suffered massive floods in the year 1978, 1998 and 2010. This has also triggered

Year	Event
1910	वillage में बसाया गया था जो की के बाद किशोरी के (को) के बाद की बसाया गया था। 1910 के बाद माऊ गाँव बसाया गया था जो की के बाद की बसाया गया था।
1913	माऊ गाँव बसाया गया था जो की के बाद की बसाया गया था।
1926-77	ब्रिज बनाया गया जो की के बाद की बसाया गया था।
1978	ब्रिज के बाद गाँव की बसाया गया था।
1990	गाँव में बसाया गया था जो की के बाद की बसाया गया था।
1985-90	गाँव में बसाया गया था जो की के बाद की बसाया गया था।
1998	ब्रिज के बाद गाँव की बसाया गया था।
2000	पंपिंग का काम शुरू किया गया था जो की के बाद की बसाया गया था।
2004	ब्रिज के बाद गाँव की बसाया गया था।
2007	ब्रिज के बाद गाँव की बसाया गया था।
2007-08	ब्रिज के बाद गाँव की बसाया गया था।
2010	ब्रिज के बाद गाँव की बसाया गया था।

outmigration from the village, mainly in the year 2010.

Earlier agriculture would be rain fed. Irrigation from boring started in the year 1978, and its usage kept increasing with a significant rise after the year 2010. Earlier productivity was more and crop types included Paalage, Pulses, Sesame and potato. People started growing wheat and rice from around the year 1998 and other growing other crop types gradually reduced or stopped. Potato was grown until 1978 and 1998 and slowly people reduced its cultivation as well. Use of hybrid seeds in Paalage started in 2000.

समय के साथ बदलाव - गाँव मऊ शाहजहाँपुर						
साल	बाढ़	हाइब्रिड बीज	फसल - कृ. नदी से सिंचि	अस. बी.बी.	पत्तन	
1950	-	-	पाटा, आटा, दलहन, सिंचन, प्रयोग, बी.बी.	आटा, 1, 1, 1	1	
1978	X X X X X X	-	1, 1, 1, 1	कोरम बिंदी, आटा	1, 1, 1, 1	1
1998	X X X X X X X	-	आटा, बी.बी., गोहू, आटा, आटा, आटा	✓ ✓	1, 1, 1	1, 1
2000	-	✓ ✓ ✓	1, 1, 1, 1, आटा, कृ.	✓ ✓ ✓	1, 1	1, 1
2002	-	✓ ✓ ✓	आटा, 1, 1, 1	✓ ✓ ✓	1, 1	1, 1
2010	X X X X X X	✓ ✓ ✓ ✓ ✓ ✓	1, 1, 1, 1	✓ ✓ ✓ ✓ ✓ ✓	1, 1, 1	1, 1, 1