Evaluation of River Basin Programme in Bihar, India

Full Report

Oxfam GB Programme Evaluation

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The Oxfam GB evaluation team visited the Bihar DRR programme during December 2007. The evaluation study team leader prepared this report on the basis of the team's work and field notes.

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Responsibility for the opinions expressed in this report rests solely with the authors.

Acronyms

BDO Block Development Officer
BSS Bihar Seva Samiti
DRR Disaster Risk Reduction
ECHO European Commission Humanitarian Office
EWS Early Warning Systems
FGDs Focus Group Discussions
IAY Indira Awaas Yojana
NGOs Non-Governmental Organisations
NREGS National Employment Guarantee Scheme
SDO Sub-Divisional Officer
SSIs Semi-Structured Interviews
RBP River Basin Programme
VDPCs Village Disaster Preparedness Committees

Executive Summary
This evaluation study report addresses the question of the impact of the Disaster Risk Reduction (DRR) interventions before, during and after floods especially on poor vulnerable households and target groups like women, disabled and minorities (religious, ethnic and castes) in the RBP assisted communities of Bihar state. The River Basin Programme has worked in Bihar since 1999 and has partnered with various local NGOs over the years. Initially it focused on relief, it has over time moved towards flood preparedness and small-scale mitigation activities, especially since 2000 with ECHO preparedness funding. Every year, Oxfam invests large resources (both human and financial) in these activities. However there are no explicit evaluative studies describing impacts during disasters of integrating DRR 'approach' and implementing interventions. Therefore as a commitment to assess and improve quality and understand impact of our risk reduction interventions, it is necessary to step- back from implementation and capture emerging lessons.

The current Bihar evaluation study in India was conducted as part of a cross-country evaluation covering three countries of India, Bangladesh and Nepal where the RBP is implemented. The assessment in Bihar was conducted during the month of December 2007. A total of 11 villages of the 41 villages in flood prone districts in North Bihar were assessed. The study used a combination of quantitative and qualitative data collection techniques that included household surveys, focus groups discussions, transect walks, hazard assessment, semi-structured interviews, seasonal calendars and stakeholder interviews.

Why flood risk is increasing: a community perspective
The findings of the study suggest that flood risk is on the increase. From a community perspective some of the reasons that were commonly cited to explain this trend include the breaching on water reservoirs, flow of water much above its danger level due to inadequate capacity within the banks of the river to contain high flows and changes in the monsoonal seasonal patterns.

Disaster Preparedness
In order to cope with the increasing flood risk various preparedness measures are being adopted locally at the individual, community and institutional level (government and NGOs) to reduce/mitigate the impact of floods and other water induced disasters. Some of the commonly cited disaster preparedness mechanisms include early warning systems, community contingency plans, village disaster preparedness committees, training and capacity building of local structures, and small-scale mitigation structures (homestead plinth raising, flood shelters, storage facilities and raising of tube-wells). The implementation and adoption of the disaster preparedness activities varied in the villages that were visited during the evaluation study. This largely depended on the level of integration of the DRR activities at the community level as well as the different technical capacities of the partners working in the RBP programme area.

Impact of floods
The impact of flooding is devastating and varied from one location to another. In the context of Bihar it would appear that the west (Sitamahri and Benepatti) suffered more due to floods compared to the east (Andrathadi). Not only is the trend of flooding becoming of high magnitude; flood events are frequently being associated with severe damages and disruption to people's livelihoods. The commonly mentioned impact of floods includes loss of crops, loss of livestock loss of assets (both productive and non-productive), loss of housing infrastructure and loss of agricultural land.

Coping and Recovery from floods
The programme has created an enabling environment to strengthen their traditional coping mechanisms to mitigate the increasing risk to flood disasters. The use of contingency stocks such as boats, life jackets, searchlights and megaphones was key to household and community during the flood period. The small-scale mitigation structures such as flood shelters were particularly an important coping mechanism for household living in the low-lying areas during the flood period. Relief efforts by both the government and non-governmental organisations were key to community survival during and in the aftermath of flooding.

Different households have different ways of defining what recovery means for them. In general recovery is typified by some sense of normalcy in the community and, reconstruction was mentioned to be something that can last several years and is characterised by rebuilding infrastructure and community livelihoods in the village. It is important to highlight that some are not able to bounce back

to normalcy before the next flood season. As a result it was observed that a majority of households rarely go beyond the recovery phase to complete reconstruction.

Conclusion and Recommendations for programming

Based on the analysis of the evaluation study, a number of recommendations have been identified to scale up and further improve the RBP programme in Bihar. The need to implement an integrated model for disaster management must be given high priority and adopt more structural measures in villages where this is not currently being done. Capacity building for integrated disaster management needs to be considered, as there is an apparent skills gap in the areas risk assessment, risk reduction measures and community/social mobilisation among related subjects. There is need to explore suitable options for agriculture in the flood prone areas as the traditional practices continue to be heavily affected by continued flooding. Crop selection and alternative farming practices/techniques need to be considered. The RBP needs to consider strengthening its activities in the livestock management sector. Such activities may include organising vaccination campaigns during the pre and post flood period, provision of fodder and the construction livestock shelters in high flood prone areas. Linkages with the local authority and government structures including advocacy for greater responsibility should be further strengthened.

Background
The River Basin Programme (RBP) has worked in Bihar since 1999 and has partnered with various local NGOs over the years. Initially focusing on relief, it has over time moved towards flood preparedness and mitigation activities, especially since 2000 with ECHO preparedness funding.
Presently it is working with Bihar Seva Samiti (BSS) (1999), SAKHI (2003), Abhigyan Disha (ADISHA) (2003), and ADITHI (2005). This mix of partners has been intentional to bring a range of skills and capacity to the team working in Bihar. And it aims to include gender awareness and programming, as well as advocacy and sharing of good practice with government structures and other interested agencies working in flood preparedness and mitigation action the State.

The major focus for the past 3 years[1] has been on flood preparedness and reduction of losses of the vulnerable communities, by strengthening the livelihood options through improved and more varied agriculture (e.g. change in cropping patterns), livestock issues and assistance with small vending and access to markets. At the same time attention to gender and diversity issues in these villages has been emphasized. The increase of dialogue through sharing of good practice and success stories, as well as direct advocacy has also aimed to improve linkages to local and district / state level government and hence voice and options for local communities. The programme also aims to bring knowledge of government programmes to the local community.

The RBP works in 41 villages in flood prone districts in north Bihar. The villages are chosen for a range of factors, including caste and religious discrimination, as well as flood issues. Village Disaster Preparedness Committees (VDPC) are formed and trained in various flood preparedness and mitigation activities, and comprise 50% women. Actual activities in each location vary due to both local needs (e.g. flood shelters or homestead raising), as well as capacity of the local partners to provide specific training or services (e.g. fisheries support from Sakhi). Several of these activities aim to reduce water bourne diseases through improving water, sanitation and hygiene practices both between and during flood periods. Alongside the VDPCs is formation of Self Help Groups (SHGs) and gender training initiatives. The livelihood activities focus mainly on agricultural, livestock and fisheries issues across these rural communities[2], however some small-scale off-farm vending activities are also being supported. Support to women in these communities to improve their food security / economic viability, assume leadership positions, and improve the status of women generally has been a focus of the work. In addition the link between disaster preparedness / mitigation and various agricultural activities has been highlighted.

Also in the last year the RBP has aimed to move to a Vision[3] where it aims “at a change model of villages becoming resilient to flooding”, and “moving leadership from partners to village communities themselves and initiating livelihood improvements along with flood preparedness and demonstrating that both complement each other”.

Methodology
The study used a combination of quantitative and qualitative data collection techniques that included household survey, focus group discussion, transect walks, hazard assessment, semi-structured interviews, seasonal calendars, and interviews with stakeholders.

Sampling
Size and structure of the household sample
Sampling for the household survey was a compromise of between the ideal and the affordable. It was not designed to generate statistically significant results. However, the sampling procedure applied ensured that the results are representative for the survey population in the RB programme area.

For the household survey, a stratified multiple stage random sampling procedure was used. The sampling frame consisted of all villages being assisted by Oxfam (India) Trust and its implementing partners, geographically stratified according to flood severity i.e. high flood prone and moderate flood prone villages. Stratification of the villages ensured the reduction of heterogeneity of the sample. A two-stage random sampling was taken, as summarised in the table below:

[1] See Annex 2 RBP India Review, Sept 2006
[2] See One Day Refection workshop report on Impact of Livelihood Support, held at Sakhi, Nov 2006
[3] See RPB India Review, Sept 2006

Table1: Size and structure of the two-stage random sampling procedure

Sampling Unit	Procedure	Number per strata		Total number in sample	
		High flood prone	Moderate flood prone	Planned	Actual
Village	Random sampling (computerized)	25	28	11	11
Household	Random: 20 per village (computerized)	110	120	220	217

The two stages of random sampling (i.e. selection of survey villages and households) was computerized using a random sampling software (graphpad.com) prior to the fieldwork on the basis of beneficiary villages and households lists provided by the implementing partners.

Sampling for qualitative data collection

The qualitative data collection applied a mix of tools described above. Similar to the quantitative survey, the qualitative sample does not claim to be statistical in any sense, and care will be taken in generalizing location specific findings. Focus group discussions, stakeholder interviews and SSIs were conducted in all the sampled villages as part of the core methodology. Other qualitative methods such as seasonal calendars, timelines, transect walks and hazard assessments were applied as required by the evaluation team as required. This resulted in 11 focus group discussions, 10 SSIs, 1 seasonal calendar, 1 hazard assessment and 9 transect walks were conducted as part of the qualitative methodology application.

Demographic Characteristics

Household Size, Age and Sex Composition of HH members

The average household size for the survey household is 7 people. A majority of households have between 4 – 6 household members (41.9%), 11.7% points higher than the 7 – 9 category). 46% of the survey population is between the 18-59 years age group. The elderly population makes up only 6% of the population. There are no significant differences between the male and female population sizes.

Table 2: Household size, age and sex composition of household members

Demographic Variable		Frequency		Percentage
Number of HH Members		**N=217***		
1 to 3 people 4 to 6 people 7 to 9 people 10 to 12 people 13+ people		**24** **91** **72** **23** **7** **Data missing for 1 household*		**11.1** **41.9** **33.2** **10.6** **3.2**
Average household size		**7**		
Age Structure by Sex	**Male**	**Female**	**Total**	**Percentage**
0 – 5 years	*139*	*142*	**281**	**18**
6 – 17 years	*245*	*198*	**443**	**29**
18 – 59 years	*362*	*348*	**710**	**46**
=/>60 years	*48*	*46*	**94**	**6**
Total	*794*	*734*	**1528**	**100**

Data for school attendance was collected for children aged between 6 – 17 years. Results show that regular school attendance is higher for boys than for girls. However, drop out rates appear to be higher for boys than for girls. For households that have male school dropouts the commonly cited reasons for dropping out are working at home and lack of money. On average, 37% of the girls are dropping out of school mainly due to lack of financial resources and working at home.

22% of the respondents had a disabled household member. There are more disabled male household members compared to their female counterparts and 64% (28) of the disabled household members are within the 18-59 years age category. 4% are in the elderly category with the remaining falling into the 6-17 years age category.

Characteristics of household heads

The household head is defined as the member of the household who manages household activities, makes most decisions and takes responsibility for all household-related matters. The majority of household heads are aged between 18-59 years (171HHs) – the economically productive age group. 20.8% of the households are considered to be elderly headed households. There were no child-headed households among the survey respondents. There is almost an equal percent of male and female-headed households[4]. The relatively high proportion of female-headed households is mainly due to seasonal out-migration of men, which creates "*de facto"* female-headed households. Men are migrating to work in towns and other states while their wives work in the household fields and take care of the family. Functional literacy levels of the household heads were also investigated in the study. 68.9% of the household heads reported that they were not able to read or write in any language while 31.1% indicated that they were able to read and write. Similarly, a majority of the spouses of the household heads were not able to read or write in any language. Although there are no significant differences in functional literacy levels, it appears to be high among women when compared to men.

Table 3: Age, sex, marital status and education of household heads

Variable			Frequency		Percentage	
Age Group			**N=216**			
18 – 59 years			171		***79.2***	
=/>60 years			45		***20.8***	
Sex			**N=217**			
Male			115		***53***	
Female			102		***47***	
Marital Status			**N=218**			
Married			186		***85.3***	
Partner, not married			1		***0.5***	
Living apart, not divorced			31		***14.2***	
Functional literacy						
	N=75	**N=47**	**Percentage**		**Total**	
	Male	**Female**	**Male**	**Female**	**N**	**%**
Able to read or write	30	8	***40***	***17***	38	***31.1***
Not able to read or write	45	39	***60***	***83***	84	***68.9***

**N values different because data was missing for some respondents*

Household Livelihood Situation

Household income sources

Households engage in various activities to gain and maintain their livelihoods. The nature of these activities is variable depending on the availability of assets, resources, labour, skills, and gender among other factors. Within the household, members perform different activities to contribute to "household livelihood security".

The quantitative survey findings indicate that a large percent of households rely on remittances (34.6%) and casual labour, mainly farm laborers (34.1%) as their main source of income. Similarly casual labour activities and remittances were also indicated as the second most important source of income for a majority of households. Data from the qualitative findings suggests that increased flow of remittances is a result of temporary male out-migration in search of wage labour and other employment opportunities.

Table 4: Household income/livelihood options

Livelihood Sources	Most Important (n=217)		Second (n=169)		Third (n=90)	
	N	**%**	**N**	**%**	**N**	**%**

[4] A female-headed household may either be "de jure" or "de facto". In "de jure" female-headed households a female person is the main breadwinner and owns the household resources. The women are usually widowed, abandoned or divorced. "De-facto" female-headed households are those in which the male head is temporarily away and returns occasionally and sometimes sends remittances to support the family.

Remittance	*75*	**34.6**	*30*	**17.8**	*13*	**14.4**
Food crop production/sales	*22*	**10.1**	*22*	**13.0**	*5*	**5.6**
Cash crop production	*2*	**0.9**	*7*	**4.1**	*6*	**6.7**
Casual labour	*74*	**34.1**	*61*	**36.1**	*8*	**8.9**
Begging	*3*	**1.8**	*1*	**0.6**	*1*	**1.1**
Livestock production/sales	*4*	**1.8**	*28*	**16.6**	*42*	**46.7**
Fishing/Fish Farming	*5*	**2.3**	*1*	**0.6**	*2*	**2.2**
Petty trading/small business	*14*	**6.5**	*3*	**1.8**	*2*	**2.2**
Weaver/Sewing	*-*	**-**	*-*	**-**	*-*	**-**
Formal Salary/Wages	*2*	**0.9**	*2*	**1.2**	*-*	**-**
Vegetable sales/production	*4*	**1.8**	*1*	**0.6**	*1*	**1.1**
Food Assistance	*-*	**-**	*-*	**-**	*-*	**-**
Make fishing net	*-*	**-**	*-*	**-**	*-*	**-**
No other source	*-*	**-**	*1*	**0.6**	*1*	**1.1**
Other	*11*	**5.1**	*12*	**7.1**	*9*	**10.0**

A significant number of households also rely on livestock production/rearing as a source of income as can be seen in the table above. Livestock (e.g. cattle, buffalos, goats etc) still occupy a major role in both risk management and as a livelihood option for a majority of households. For some households it is the main source of income*, "I do not own any land and my buffalo is the main source of income. It gives me 5 litres of milk per day which I sale and earns me Rs 60 a day"* explained one respondent.

Households that rely on agriculture for their income source, sharecropping (for the landless families) and cultivation of own land are the common forms of agriculture. Land is crucial for production, but 59% of the survey respondents are landless and the remaining 41% own very small pieces of land. Thus is not possible for households to depend solely on their own production. As a result, crop production for the smaller farmers is largely for consumption purposes.

Borrowing and Credit

Borrowing is an extremely important coping strategy for rural households. Households borrow from different sources and for different reasons and in particular to meet basic needs and invest in other activities. The percentage of households interviewed who reported having borrowed 4 months preceding the survey is 72%. There are several reasons for taking loans and these have been reflected in the survey. Households are mainly taking consumption (36%) and health care (31%) loans. No borrowing for social purposes was reported. 13% and 10% borrowed to purchase of agricultural inputs and repair/construct their houses respectively.

Different sources of loans have been observed in the study area. 60% of the household loans are taken from informal moneylenders. Landlords account for 13% of the household loans. Interest rates on the loans are as high as 60% in some instances and this can be explained by the fact that a majority of the households are taking their loans from moneylenders. Regardless of the high interest rates, loans are also given on the basis of collateral security in the form of household assets and other valuables. This has meant that households are continuously in debt and ultimately their coping/recovery capacity the impact of floods is severely limited. There is a general increase in the number and amounts of loans taken during and after the flood season as households try to smooth consumption and cope with the impact of floods and households resort to mortgaging of assets to moneylenders in order to secure a loan. Generally, the observed population is poor, households find it difficult to repay their loans until their have recovered their income earning capacity e.g. when casual labour opportunities are available and remittances start trickling in.

Food Security Indicators

Food sources, stock and consumption

Three indicators relating to food security were derived from the household survey: (i) food sources, (ii) number of months a household's food from own production can last and, (iii) number of meals eaten per day (for adults and adolescents).

The survey data indicated that a majority of the households rely on purchases and borrowing both averaging 30.5%. Causal labour was the main source of food for 19% of the households (a further

confirmation of its importance as an income source) while a further 11% percent relied on their own production or harvest. In terms of food stocks from own production, 49% of households had none. 20.2% had enough for 2-3 months while 16.2% had enough for 4+ months. Households that did not have food stocks from own production (151 families) were also asked when it was finished, 60.3% indicated that they never had any stock, 21.2% had finished their stock the previous month while for the remainder had their food stocks finished between 2 – 7 months. An analysis of the same variable by male/female household headship also indicates that female-headed households are more vulnerable to food insecurity compared to the male-headed households as shown below.

Table 5: Household food stock

Indicators	Category	Male headed households		Female Headed households	
		N	%	N	%
Food Stock	None	42	***40.4***	54	***58.1***
	Up to one month	20	***19.2***	9	***9.7***
	Enough for 2-3 months	24	***23.1***	16	***17.2***
	Enough for 4 months	18	***17.3***	14	***15.1***

Meal consumption patterns

As with the, 'amount of food from own production' indicator, 'meals per day' indicator appears to generate credible information on the different levels of vulnerability of survey population sample. Results indicate that 60.1% of the adults aged 18+ years, ate 2 meals the day before the survey interview. 31.3% are having 3 meals a day. 35.1% and 33.9% of the adolescent children aged 6-17 years are having 3 and 4 meals a day respectively. This suggests a deliberate shift in consumption by adults and children to ensure survival during this period of food insecurity.

Table 6: Meal consumption by sex of household head

Indicator	Category	Male headed households				Female headed households			
		Adults		Adolescents		Adults		Adolescents	
		N	%	N	%	N	%	N	%
Meals per day	1	1	***0.9***	0	***0***	5	***5.2***	2	***2.4***
	2	61	***55.3***	9	***10***	63	***64.9***	16	***19***
	3	39	***35***	33	***36.7***	26	***26.8***	28	***33.3***
	4	9	***8.2***	33	***36.7***	3	***3.1***	26	***31***
	5	-	***-***	15	***16.7***	-	***-***	12	***14***

Land Holding

Household access to land is an important indicator of productivity especially for households that rely on agriculture as their main livelihood option. As highlighted elsewhere, 59% of the interviewed households did not have any access to land highlighting the fact that a majority of survey households are landless. Landlessness is high in Mallah Tola village where all the interviewed households did not own any fields/gardens while more households (70%) own land in Bhaduar village followed by Madana village. 56.3% of the households that owned land did not have their fields planted. The major reason for not planting was access to land. 'Other' option was cited as the most common reason for not planting for a majority of households. In this case 52.6% 'other' means loss of land due to sand casting, riverbank erosion and water logging. A result of heavy siltation is that land becomes un-suitable for farming for periods of up to 5 years in some cases where no land reclamation activities are done.

Household Assets

A major indicator for measuring economic security of a household is to estimate the value of key productive, non-productive and liquid assets owned by the household as they demonstrate the productive capacity of the household. It was not the objective of this evaluation to estimate the value of the household assets. Asset ownership was investigated to understand the different types of assets households own and also determine the extent of asset loss during the flood season. The distribution

of these two asset categories is presented in the table below. The percentage of female-headed households holding assets is lower for all types of assets compared to male-headed households.

Table 7: Asset ownership by asset type

Asset	Survey population		Male headed		Female headed	
	N	%	N	%	N	%
Land	94	***43.7***	56	***54.9***	38	***41.8***
Fishing nets	11	***5.0***	8	***8.2***	3	***3.4***
Fishing boats	6	***2.8***	4	***4.2***	2	***2.3***
Canoes	5	***2.3***	4	***4.3***	2	***2.3***
Seeds	62	***28.4***	38	***37.6***	24	***26.7***
Rickshaw/van	1	***0.5***	1	***1.1***	-	***-***
Ox cart	10	***4.6***	8	***8.2***	2	***2.3***
Wood tree	48	***22.0***	33	***33.3***	15	***17***
Jewellery	34	***15.6***	20	***21.5***	14	***15.6***
Cooking utensils	203	***93.1***	108	***97.3***	94	***95.9***
Radio	43	***19.7***	27	***29***	16	***18***
Motorbike	7	***3.2***	5	***5.6***	2	***2.3***
Mobile phone	7	***3.2***	4	***4.5***	3	***3.5***
Television	2	***0.9***	2	***2.2***	-	***-***
Bed/mat/blankets	190	***87.2***	103	***93.6***	86	***90.5***
Bench/chairs/table	74	***33.9***	41	***41***	33	***36.3***
Dwelling house	185	***84.7***	107	***94.7***	77	***79.4***
Bicycle	72	***33***	46	***47.4***	26	***29.5***
Buckets	142	***65.1***	89	***84.8***	53	***62.4***
Hoes	133	***61.4***	82	***83.7***	51	***69.9***
Sickle	139	***63.8***	85	***85.9***	54	***74***
Clothes	155	***71.1***	93	***93.9***	62	***84.9***
Other agricultural equipment	74	***33.9***	45	***51.1***	29	***43.3***
Other	5	***2.3***	3	***4.8***	2	***3.9***

Pre-flood livestock ownership

Livestock have an intrinsic value as a form of physical savings, but also some animals notably oxen and cattle also have productive utility in farming and income from selling milk. Hence the raising of livestock occupies a significant proportion of livelihoods for the villages that were visited. The most commonly owned type of livestock is draught cattle/buffalos and other cattle/buffalos. 78 households reported owning livestock. Percentage of households that own 1-4 of the different livestock is higher than those who own between 5-9 and 10+ livestock. Most households own between 1 to 4 livestock. 23.2% and 15.4% of the households own between 5 – 9 draught cattle/buffalos and goats respectively. Only a small percent of the respondents own an improved stock of livestock.

Table 8: Livestock owned before flood

	Respondents owning livestock		1 - 4		5- 9		10+	
	n	%	n	%	n	%	n	%
Draught cattle/buffalos	78	***35.8***	60	***76.9***	18	***23.1***	-	***-***
Other cattle/buffalos	88	***40***	88	***100***	-	***-***	-	***-***
Goats	78	***35.8***	65	***83.3***	12	***15.4***	1	***1.3***
Sheep	1	***0.46***	1	***100***	-	***-***	-	***-***
Pigs	1	***0.46***	1	***100***	-	***-***	-	***-***
Poultry	9	***4.1***	5	***55.6***	3	***33.3***	1	***11.1***

Families raise different type of livestock for different reasons. For example qualitative data indicates that cows and buffalos are important in the agricultural system as draught power, ploughing, transport and dung. The dung is used as fuel in villages as there is a general shortage of firewood. Access to sufficient quantities of fodder and outbreak of animal diseases are ongoing problems for livestock production and flooding exacerbates the problem. There is a close relationship between flooding and shortage of animal fodder and the outbreak of diseases (see seasonal calendar for Murahi Tola village).

Water and Sanitation: pre-flood situation

76.5% of the households did not have access to latrines with only 23.5% reporting having access to latrines. Of the 138 respondents who replied to the question on the type of latrine used by the household, 69.6% use open space. 17.4% and 9.4% are using the ring/slab not sealed and ring/slab sealed latrines respectively. The use of open space as latrines was also confirmed by the qualitative study i.e. observation/transect walks, which showed that open defecation was a common practice. The situation is different where the community has received latrine construction support from the implementing partners e.g. Gangi Jamuri village. In other villages such as Gaibipur, Oxfam and its partner are promoting the concept of borehole latrines and this have managed to keep the village free from fecal matter. In some villages like Bhoga Tola, the communities are not able to use the constructed latrines because they are now full and some are collapsed as a result of riverbank erosion and flooding.

The use of tube well water for drinking and cooking is very high in among the survey respondents. A majority of households have access to their own tube wells. Where individuals do not have access to tube wells, they use the neighbours'. A significant "other" means access to clean water is through communal or household level tube wells constructed by the implementing partners. It was observed during the assessment that there is no sense of community ownership of assets provided by the partners through the RBP among the beneficiaries, and as a result most of them were mentioning the name of the partner when asked about the different sources of water for different purposes.

Table 9: Sources of water during the non-flood season

Water use	Own tube-well		Neighbor's tube-well		Pond		River/Canal		Other *(specify)*	
	N	*%*	N	*%*	N	*%*	N	*%*	N	*%*
Drinking	84	***38.9***	69	***31.9***	-	***-***	-	***-***	63	***29.2***
Washing	85	***39.0***	65	***29.8***	1	***0.5***	3	***1.4***	64	***29.4***
Cooking	84	***38.5***	69	***31.7***	-	***-***	-	***-***	65	***29.8***
Bathing	85	***39.2***	66	***30.4***	1	***0.5***	2	***0.9***	63	***29.0***

Why flood risk is increasing: community perspective

Among all the natural disasters afflicting the Bihar district, the most common is the flooding which causes severe damage to life and property in Bihar state. This section of the report explains the trend

of flooding in the communities that were visited. This does not present a detailed review of secondary documents but presents mainly the perspective of the community and other stakeholders that were spoken to during the evaluation period. Generally the incidence and intensity of flooding has grown alarmingly over the years. Some of the reasons that were cited for this increased flooding trend were development and population pressure; breaches of embankments; the breaching of water reservoir; flow of water much above its danger level due to inadequate capacity within the banks of the river to contain high flows and changes in the monsoonal seasonal patterns.

The construction and poor structural maintenance of embankments has long been associated with severe flooding. Some community members told that embankment breaches have been one of the major causes of flooding in their communities. In Mullah Tolla village of Sitamahri block, discussions with the VDPC indicates that the continuous breach of the embankment often results in severe flooding: *"before 1954, we did not have this embankment, the construction of this embankment was started in 1962 and was completed in 1967. Since then we have seen increased flooding in this village because of embankment breaching. The release of water from the dam which exceeds the capacity of the river often causes the breach of embankment as the water finds weak points to flow".* In Radhanagar village Benipatti block, flooding is mainly attributed to breaching of the embankment Koshi canal. There is also a feeling that embankments are depriving the benefits of natural flood flow. When embankments were constructed the situation has been that regular flooding is reduced for villages inside the embankments but the impact of huge flooding is increased by embankment breaches.

Flooding is also generally regarded, as a natural phenomenon in some communities and attributed to the increased magnitude of the monsoon rainfall. Community members spoken to believe that they generally experienced a big flood every three years and normal/regular flooding on an annual basis. What appears to have changed is that when they have a big flood it is now lasting for a longer period compared to previous years. In most years flooding has occurred for a brief period and has not had a major impact on life. It is the big floods that normally result in huge losses of life and livelihoods. There is also increased impact of flooding as a result of river course changes in the communities. For example in Karnpur villages when the river changed its course there was severe destruction and loss of land and houses. Similarly in villages such a Bhoga Tolla, it is riverbank erosion and flooding that is resulting in severe losses of land and destruction of houses. In generally the gradual movement of the river often affects those located on the banks of large rivers. They are also flooded on an annual or frequent basis.

Table 10: An brief ethno-history of flood events in 7 of the study villages

Village	Event
Radhanagar	**Flood:** 1987, 2004, 2007 Breaching of Koshi canal and increased volume of Kamal river water caused flooding in 2004 and 2007. Huge volume of floodwater entered the village. 50% of agriculture land left fallow because of water logging and sand casting. Huge losses of assets, animal and, mud wall and thatched houses collapsed. There was an outbreak of diarrhoea in 2007.
Murahi/Mallah Tolla	**Flood:** 1954, 1977, 1993, 2004, 2007 In 1977, flooding was a result of the completion of embankment construction. Government provided land and shifted people to present location. There was severe loss of life and assets. The flood in 1993 was not so severe. It resulted from the breaching of dam and opening of Bagmati river. 2004 and 2007 floods were more severe, a result of breaching of Bagmati embankment which is 2km from the villages. 100 houses were completely destroyed in Mallah Tolla in 2004. Murahi Tolla, impact more severe in 2007 due heavy siltation, rendering the land un-cultivable for 3-4 years, all houses collapsed. Considered to be the biggest flood by the community.

Bhoga Tolla	**Flood:** 1975, 2004, 2007 In 1975 flooding perceived to be a result of construction of upstream dams by the government of India. However, since 2004 flood severity has decreased due to raising of homesteads hence no one leaves the village during the flooding period. The main problem however is riverbank erosion
Gobrahi	**Flood:** 1997, 2004 2007 These years were mentioned as particularly bad flood years
Madana	**Flood:** 1987, 198, 2004, 2007 2007 was worse the other years. In 2007, it flooded six times during the monsoon season while in 2004 they only experienced flooding two times.
Baduar	**Flood:** 1987, 2004, 2007 The flood in 2004 was a result of the breaching the embankment that is 800m away from the village and this caused high degree of damage. Brick houses were destroyed. Since then, the government has repaired the embankment and the flooding has not been bad for those on the outside of the embankment. Even those living between the river and the embankment did not have to leave their homes in 2007. Another bad flood was in 1987
Karnpur	**Flood:** 2002, 2004, 2007 2002 and 2004 were mentioned as the worst flood years. Village lie in between Kumla and Balan rivers. Kumla river is moving towards the village and used to be many kms away. They are also near Kosi canal. Flooding was not so bad in 2007 but rains were too heavy. Since 2004 there water is entering their houses and this blamed on the Kumla river that is moving closer to the village. The embankments are old and rat holes cause them to suddenly collapse.

Preparedness

Different preparedness strategies have been adopted locally at the individual, community and institutional level (government and NGOs) to reduce the impact of floods and other water induced disaster. This section of the report will focus on the different preparedness activities that have been implemented. Focus will be on reviewing the activities implemented by Oxfam and it partners as part of the river basin programme.

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Early Warning Systems

Flood early warning systems are essential instruments to minimize damages caused by floods, providing a forecast with days or hours in advance of the areas that are going to be flooded, water levels and possibly water velocity allows for a series of preventive measures to be taken by the concerned population.

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70.8% of the respondents confirmed that they are aware of village early warning systems to receive information on floods coming. Information on floods coming is mainly received through the radio (42%). The role of the community volunteer network (VDPC members) was also an important source of early warning messages. A significant other indicates community based early warning messages such a beating of drums and informal sharing of messages by the community. There high level of community satisfaction with the way the community EWS are working with 47% and 16% indicating being satisfied and very satisfied with the way the EWS is working. However, there is a percentage of respondents who were not satisfied with the way the EWS are working. 26% of the respondents expressed dissatisfied with the way the EWS is working. This has been explained with the sending of misleading messages over the radio regarding the anticipated flood level.

Qualitative data also suggests a strong relationship between the effectiveness of the VDPCs and the way some community based EWS work. Where the VDPCs are well trained and actively involved the EWS are reportedly working very well compared to where the VDPCs are not functional e.g. the use of megaphones as an early warning communication tool.

In addition to the formal EWS, rural people have shown that they are closely involved with their environment and this is evidenced by their knowledge and experience. Outside the formal system flood warning systems is also based upon observation and experience that is gathered over generations. In Madana village for example, they visually monitor water levels during the flood period depending on rate at which the water is rising, *"this is a small local village and it is not announced on radio so we use our own local knowledge and usually rises slowly enough so we have time to move. Also if large rivers are announced, then we know our river will arise".* Dissemination of information about a potential flood coming is done informally through personal contacts either in person or through drum beating and the use of megaphones in a growing number of cases.

Community contingency plans

Community contingency plans were also prepared by the VDPC with the support of the implementing partners to ensure that the communities are organized and are able to systematically respond to flooding situations. 44.6% (95) of the respondents indicated that they are aware of village based contingency plans and of these, 31% participated in the contingency planning process. Testing of contingency plans is an important activity to ensure that they are kept up to date and practical. 31% of the household survey respondents are aware of village contingency plans being tested regularly. The most commonly mentioned way in which contingency plans are tested is through regular reviews. Drills and trainings as a way of reviewing contingency plans both averaged 21%. Simulation was not a very common way of testing contingency plans.

VDPCs: a social approach to preparedness

VDPCs members have been selected and trained in some of the flood affected villages that were visited and are playing an important role in disaster management. The VDPCs have been divided into four different taskforces i.e. relief and rehabilitation, information and communication, early warning and damage assessment. Some of these committees have undergone trainings on first aid, disaster preparedness, search and rescue. These skills are supposed to help the community react to any disasters and survive several days without external aid. There is room for improvement in terms of the delivery of training of the VDPCs in all the project areas and most importantly in Sitamahri block where the VDPC appear to be lacking in terms of capacity compared to the other RBP blocks of Bihar.

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Our survey data indicates that 68.7% of the respondents indicated that VDPCs have been formed at village level as part of the RBP programme. 24.5% of the respondents were actually members of the VDPCs. This is a significant achievement on the part of the partners. VDPCs were universal in the villages that were visited although in Sitamarhi they have not yet received adequate training. One of the main challenges faced by the VDPCs is lack of clarity of their roles and responsibilities during the non-flood and flood season. This has often meant that the coordination of flood disaster management activities has been compromised during the flood period. This highlights the need for the RBP to come up with clear-cut roles and responsibilities for the VDPCs for them to fully assume the role of disaster management during the flood period.

Training and Capacity Building

Training and capacity building is an essential component of the RBP programme. There are various trainings that are delivered to the community which focus on disaster response type of activities such as first aid, search and rescue, flood awareness and emergency preparedness. The household survey sought to establish the number of respondents who participated in these trainings and whether they found it useful through its application. The results of the survey show that only 21.6% of the respondents reported having attended some disaster management training. The result shows that only a small percentage of the communities were able to attend disaster management trainings. This is probably due to the fact that some of the trainings that have been conducted so far are targeting mainly members of the VDPC. The most commonly attended training is flood awareness with 26 participants

followed by first aid, which had 8 participants. There is a gender balance between the number of men and women attending the training with more women reporting taking part in the trainings compared to their male counterparts.

Small-scale mitigation structures
A wide range of different small-scale mitigation activities has been implemented in the RBP areas as part of preparedness activities.

Homestead plinth raising
One of the key flood preparedness activities at the household level is plinth rising. 44.9% of the respondents indicated that their house is on a raised plinth. The majority of these have been supported by NGOs (58.6%) to raise the plinth of the house. 37.1% had raised their plinths on their own. 34.5% and 65.5% of the raised plinths were above and below the flood level respectively. 65.5% indicated that the plinth of the house is not above the flood level. Flood activity has been variable over the years and the flood water level is not the same as during a normal flood. It is therefore not surprising that most respondents indicated that their plinths are not above the flood level considering the severity of the recent floods. In general most houses in rural communities are built on a raised mud plinth, which in most cases is affected throughout the year by weather and domestic activities. This means that in most cases the plinths are already weakened by the time of the flood season. After the flood households spent much time trying to make repairs to the plinth and the house in general in preparation of the flood season. Adding a small amount of cement when constructing the plinth would make it stronger, although in other villages they preferred to use other available materials such as bamboo to deflect the water.

Flood shelters
Of the villages that were visited, 21.9% were reported that they have flood shelters in their villages. Indeed not all villages have flood shelters as part of flood preparedness initiatives. The construction of flood shelters has been a targeted approach, focusing on those communities that are more vulnerable flooding. Some villages have also benefited from the construction of flood protection structures from the government. In some villages some community members move to the embankments and construct temporary shelters during the flood period.

Storage facilities
Communal grain and contingency stock storage facility are an important asset for the community during the flood period. The RBP has facilitated the construction of community grain storage facility in some communities as part of the RBP preparedness activities although not many were seen in the evaluation study villages. A grain storage facility was observed in Radhanagar village and Gangi Jamuri village.

As a result some households have constructed their own flood resistant storage facilities (i.e. Machans – structure of bamboo). These are particularly useful for storing food grains, seeds and other household assets. Machans can either be constructed inside the house or outside the house depending on the availability of space. Other community led initiatives that were highlighted to the evaluation study team include hanging of small items such clothes, utensils on the roof above the flood level. This provides a degree of protection especially where the house has little risk of collapsing due to flooding.

Raising of tube wells
The height of tube wells have been raised in several villages by adding pipes in order to locate the outlet above the flood level. Raised tube wells can also be on a platform to protect them from being inundated from floodwaters.

Group/Individual preparedness
Communities have accumulated preparedness and coping mechanisms through the exposure to recurring threat of flooding with varying success in minimizing loss and protecting lives. These local capacities have included strengthening of houses above the flood level, use of bamboo and banana rafts during the floods, putting aside some food stock in sealed containers in a safe place. 81.8% of the respondents from the survey were able to confirm that they make some preparations before any floods. Building up stocks so as to meet future hardship during the calamity is a common practice. Since flood disasters are a regular phenomenon, rural households indicated they normally prepare for the

unexpected eventualities. The most common forms of preparation that households engage in is stocking food and making savings. Although the stocking of grain and repair of houses is a common practice, data from the quantitative study indicates it is less significant compared to stocking of food. Data from the FGDs also indicates that from *June* onwards communities collect food and fodder, kerosene in preparation for staying up on the road/embankments during the flood period.

[Figure Removed]

Awareness

Only when people are aware of the severity of hazards that may affect them, the associated risks, probable damage and precautions to be taken, can a community be effectively mobilized to reduce risks to disasters. Another issue closely related to awareness is ownership. The communities need to be able to claim ownership of the different activities taking place in their community in relation to disaster management.

There is high level of community awareness of the various disasters that affect their communities. This is a mainly a result of public awareness programmes that they have been exposed to in addition to their knowledge of living with disasters. However, when it comes to ownership, significant gaps were identified in the RBP programme. RBP partners are still lacking social mobilization social skills. There is a general feeling in the communities that the structures constructed by the partners are not their as they constantly referred to these by the different partner organization's name. This was particularly observed when asked about the ownership of mitigation structures such as raised tube wells.

Impact of Floods

The impact of flooding in the flood area is devastating and varies from one location to another. In Bihar it would appear that the west (Sitamahri and Benepatti) suffered more flooding compared to the east (Andrathadi). Not only is the trend of flooding becoming of high magnitude; flood events are frequently being associated with severe damages, and disruption to people's livelihoods i.e. ruining crops, causing food scarcity/shortages, disruption of infrastructure and services including houses and shelter and a general increase in the health risks. This section of the report discusses the impact of flooding.

Loss of crops

Given the land-based nature of most of the livelihoods, people suffer serious consequences in terms of crop losses although the impact differs depending on the type of land ownership. Although the results of the survey indicates that a majority of households own some land, the majority of them have small pieces of land and as such do not suffer significant losses of crop. The household survey collected data on the extent of crop loss due to flooding in the RBP programme areas. Of the 157 households that had some crops in their fields during the time of flooding, 42% indicated they lost all their crops and a further 17.8% lost more than half of their standing crops. 24.2% indicated that they lost less than half of their standing crops. Crop loss in the flood-affected areas is variable. It is the vulnerable households who lose most of their crops due to flooding as their farmland is mainly situated on the low-lying areas of the villages that are more prone to flooding. 10.8% of the respondents did not lose any crops while 5.1% did not have any standing crop during the current monsoon season. The extent of crop loss is more pronounced for fields that are located on the fringes of the villages. The extent of crop loss is also dependent on the nature and cause of flooding. In villages where flooding has been a result of the breach of embankments households have incurred heavy losses due to especially if their fields are close to where the breach occurs. Similarly in a normal flood people do not incur severe crop losses as a result of flooding.

Loss of livestock

Livestock are a key component of the household livelihood system. A significant percentage of households among the poor people own livestock because of availability of grass and water and its an important income source for most families. A relatively small percentage of households reported having lost some livestock due to flooding. 26.9% of the respondents indicated losing some livestock during the most recent floods. A large percent of the respondents indicated having lost goats highlighting the level risk to flooding of such small livestock. On a comparative basis, more people are losing 'other' cattle/buffalos when compared to draught cattle/buffalos. Livestock losses not only occurred in the immediate floods but also as a consequence of stagnant floodwaters. Many households and key informants spoken too indicated that goats and cattle/buffalos died of an unknown disease (swollen foot and mouth which they attributed to standing in water for long periods).

Table 11: Livestock loss

Type of livestock	1 - 4		5- 9		10+	
	N	%	N	%	N	%
Draught cattle/buffalos	6	***85.7***	1	***14.3***	-	**-**
Other cattle/buffalos	14	***77.8***	4	***22.2***	-	**-**
Goats	31	***91.2***	3	***8.8***	-	**-**
Sheep	-	**-**	-	**-**	-	**-**
Pigs	-	**-**	-	**-**	-	**-**
Poultry	1	***20***	3	***60***	1	***20***

To illustrate the loss of livestock due to flooding, in one village, local people used to rear 106 draught cattle/buffalos, 123 other cattle/buffalos, 210 goats, 2 sheep, 2 pigs and 44 poultry. At the time of the survey at least for the respondents that indicated that they lost 8 draught cattle/buffalos, 22 other cattle/buffalos, 91 goats. It is apparent that the livestock that are most vulnerable to flooding are goats (small livestock) when compared to the big livestock. Discussions with the community indicate that more livestock were lost after the flooding when compared to during the flooding this year is mainly a result of swelling of the mouth and foot. Some households managed to save their livestock by moving them to higher ground or to neighbouring villages where flooding was less.

Loss of assets (productive and non-productive)

Respondents were asked questions relating to productive asset losses. 156 respondents answered the question on whether they had lost any productive assets during the recent floods. 44.9% of the respondents reported having lost a productive asset during the recent floods. Productive asset loss was variable among the different households. More respondents lost non-productive assets when compared to productive assets.

Loss of housing infrastructure

One of the most serious direct effects of flooding in the communities was the loss and damage of houses. This has made many villagers homeless. In the survey villages, the community resorted to different forms of strategies in order to cope with the impact of loss of houses due to flooding. Some families moved to embankments when the flood came. Others moved to nearby schools or moved in with neighbours. During the time of the evaluation study, a lot of house construction was going on in an effort to rehabilitate the houses that were damaged as a result of the flooding. In communities where small-scale mitigation activities such a homestead rising and plinth rising had been done, there was little/minimal loss of housing structures. In these communities families did not move out of their houses during the recent flood even though it was a big flood. It is important to note that each time a house is destroyed other critical assets are lost such as food stored and household goods as well. This was the common reality that the evaluation team faced high flood affected areas.

Loss of agricultural land

This is one of the serious environmental issues observed in the flood-affected areas in the west that were visited. In the study areas it was found that large amounts of silt sand was deposited on the farmland mostly in Sitamahri district villages such as Murahi, signs and there was clear evidence of heavily siltation on both farmland and homesteads (some of which were heavily silted). Heavy siltation of farmland renders it useless for periods of up to five years or even more in some cases. In villages such as Bhoga Tolla the main challenge appeared to be riverbank erosion, which has led to loss of both farmland and homestead. Similarly, due to riverbank erosion and breaching of embankments considerable numbers of houses have been destroyed. Some houses are still being rehabilitated and resource poor people are struggling to complete the construction of their homesteads. Apart from the immediate loss of homes, lives, crops and livestock, landowning households face a continuous process of sliding into vulnerability either due to the direct loss of land and hence a means of livelihood, or the more gradual loss of land productivity/fertility as a result of sand casting/siltation brought by the floodwaters.

It needs to be acknowledged that the severity of flood disaster primarily depends on the interaction between magnitude of flood and the levels of vulnerability of human settlements. Some settlements are particularly vulnerable to flooding for example, if a village is located where the breach of the embankment occurs or if it is situated in the low-lying areas of the village. In villages where ground and homestead rising activities the impact of the flood is less severe and individuals incur less losses due to flooding.

Box 1: Loss due to flooding

"We have lost our houses due to flooding. Because of riverbank erosion, some of the houses in our village are still at risk. Every year people keep shifting homesteads because of erosion. Villagers have lost their livestock. One household had 15 goats and they lost all of them. In total we lost around 40 goats in our village during the recent floods. Another family lost 5 cattle and the total for the village is 12 cattle"

Impact on women

As discussed elsewhere in this report, flooding often leads to male out-migration leaving women with much of the responsibility for dealing with floods. It therefore important to highlight how floods negatively affect women's position in a society that is cast driven and limits women's decision making powers. Illiteracy (see demographics section) and lack of access to a sustainable livelihood, for example have played a significant roles in marginalizing women and increasing their vulnerability. Women are faced with the triple responsibility of managing a household (cleaning, cooking, child rearing etc), working outside the home in the fields or taking casual labour opportunities and dealing with floods. Several women that were spoken to indicated that their workload is often higher during and after the flood period (recovery phase) compared to the normal period.

Coping and living with floods

Contingency plans and stocks

Contingency plans and stocks have been very beneficial to the community during the flooding period. Contingency stocks that were provided to the community included boats, searchlights, life jackets and megaphones among others. These stocks have proved to be very useful in facilitating disaster management during the flood period. The use and usefulness of these stocks varied from one village to another depending on the severity of the flooding. For example in Gangi Jamuri village, Bisfi block, the community was highly appreciative of the boats that were provided as part of the contingency materials, *"a man's life was saved using the rescue boat by the VDPC members and we used the megaphone as a flood early warning communication media to warn people about the flood coming. People evacuated to higher places,"* explained one respondent in the focus group discussion. However, the adequacy of contingency stocks such as boats was questioned in view of the increasing nature of flooding, *"we only have two boats one provided by the government and the other by BSS; these are not enough. During the flood period, this is the only means of transport that we have, to bring food to the village and transport the sick to the hospitals. We need more boats"*. Similarly, the use of boats is particularly important in facilitating the alternative income earning capacities e.g. selling of milk to neighbouring villages.

In some villages the use of contingency stocks were not appropriately used. As highlighted elsewhere, the way in which the VDPCs are constituted in part determines the effectiveness of the management of contingency stocks. There were reports of contingency stocks benefiting only a small clique of the community in some instances the better off (i.e. where the VDPC is dominated by the upper caste) at the expense of the most vulnerable members of the community. There is also a close relationship between the functionality or the existence of community village committee and the existence of village flood contingency plans. In villages where no committees were present or weak, there was little evidence of any informally organised community response apart from loose association of individual families brought together by their social network and need with no prior planning.

Small-scale mitigation structures

Small-scale mitigation structures such as flood shelters- where these have been constructed have become very useful during the flood period. Other activities such as ground raising, homestead and plinth raising are also beneficial to the community during the floods. Similarly the raising of tube wells and construction of grain storage facilities has ensured that the community have access to clean water during the flood period and also that there is enough food during the first few days of the flooding. It

needs to be recognized that because this year's flood was severe, some latrines that were constructed on raised ground collapsed because of riverbank erosion in cases where they were close to the river.

Different housing techniques have been adapted according to the risk posed by floods and erosion. As part of the RBP, houses in several villages have been built on raised land or earthen platforms so water cannot reach the plinth during normal floods. However, considering that the nature, severity and frequency of flooding has been variable in some instances some of these structures have not really been useful as a flood mitigation measure. As a result some houses on raised ground the recent floods destroyed earthen platforms. However, during a normal flood, there is no destruction of housing due to flooding hence families do not evacuate during the flood period.

Flood shelters are also an important component of the RBP programme. Where these have been constructed they have proved to be very useful in assisting the community with coping with the negative impact of floods. The review team only managed to visit one such flood shelter during the evaluation in Gangi Jamuri village (Bisfi block). It was found that women and children slept inside the flood shelter while men slept on the verandah of the flood shelter because this shelter does not have any physical boundaries or partitions for men and women. There were no complaints of harassment as the community took this decision collectively with the village VDPC members taking turns in keeping guard against any untoward incidents during the night. Similarly, in Gaibupur village (Benipatti block), the community did not have a flood shelter but made use of a local school where a sense of community cohesion prevailed.

Assets and Livestock

One of the major challenges posed by flooding is the loss of household assets and livestock. The need for the community to protect their assets and livestock during floods cannot be over-emphasized. As a result households adopt different strategies to protect assets and livestock. From the discussions with the community it was apparent that during the flood period livestock stay in the open where there are no flood shelters the losses are comparatively higher in instances where the community do not have flood shelters where they can move in with their livestock. The situation is particularly difficult for larger livestock such as cattle and buffalos that are often difficult to move once the villages are marooned by flooding. Where early warning signs/messages are received on time families can move cows and buffalos to higher ground (e.g. embankments) in their village or to neighbouring communities where flooding is less, however in one village the community was unwilling to move to move their animals and preferred to have shelters within the village for the animals. .

In normal times families feed their livestock with rice straw, cut and carried grass, in addition to allowing free grazing for the animals. However, in times of flooding there are few options for animals to graze and the availability of fodder is also limited so it becomes difficult for families to have enough fodder for their livestock. Thus there is a lot of fodder stocking that goes on before the pre-flood season to ensure that there is enough during the flood season.

Relief

Relief from NGOs

Both the government and, local and international NGOs provided relief items and this has enabled the community to pull through the flood period. They were many relief activities that benefited the community. However, there were concerns that were raised by different sections of the community on the way relief materials were targeted, with both the villagers and local authorities citing duplication of activities due to poor coordination. This is partly due to the influx of NGOs during the relief phase. Relief from NGOs has often focused on providing food, basic necessities (water purification tablets, water filters, blankets, utensils) and shelter.

Relief from the Government

As flooding in not uncommon to Bihar, the responsibility taken by the state in the provision of immediate disaster relief was high. Government responded with relief packages that were provided through the district magistrates and panchayats (local governing body at village level). Relief provided by the government was standard for the different areas in terms of the content of the package. Relief items that were provided included 25kgs of rice, Rs 250. However, the community has mentioned different levels of government support and this highlights the need for proper announcements of beneficiary entitlements to ensure high levels of community awareness. It was mentioned by the

community that the level of public support was not sufficient to prevent poor households from resorting to risky strategies such as taking informal loans with high interests.

Box 2: Any major relief activity waited until the flood water level had receded

"When the flood water rose, were sitting on either the embankment or the roof of their houses for days, waiting for water to subside, some families received immediate assistance from local NGOs and the government although the families largely relied on their own food, relatives and neighbours, NGO contingency stock (where available) support during this period. However, most people had to wait until floodwater had receded before they were reached by food relief and other materials".

Water

During the flood period access to water and defecation practices vary from one community to the other. Overall, there is a slight decrease in the number of households that are able to use their own tube wells during the flood season for the different household purposes. This results in a small increase in the number of families using neighbours tube wells during the flood period. No significant change were observed on the 'other' response. The small decrease can be explained by the RBP activities, which have seen a significant increase in the number of communities being assisted with raised tube wells. However no data were available to the evaluation team on the quality or infection load of water from tube wells and this may well be a problem.

Table 12: Sources of water during the flood season

Water use	Own tube-well		Neighbor's tube-well		Pond		River/Canal		Other *(specify)*	
	N	*%*	N	*%*	N	*%*	N	*%*	N	*%*
Drinking	73	***33.5***	72	***33***	-	***-***	6	***2.8***	67	***30.7***
Washing	73	***33.5***	68	***31.2***	2	***0.9***	10	***4.6***	65	***29.8***
Cooking	73	***33.6***	72	***33***	-	***-***	6	***2.8***	66	***30.4***
Bathing	73	***33.6***	68	***31.3***	2	***0.9***	9	***4.1***	65	***30***

Sanitation

Access to latrines and normal defecation are also severely affected during the flood season. 74.6% (147/197) respondents from the household questionnaire indicated that they do not have access to latrines during the flood season while the remaining 25.4% were able to access latrines during the flood season. This is almost the same percentage as during the non- flood season. Open space remains the most common defecation option for the majority of respondents during both the non-flood and flood season. While open space defecation is the most common practice for a majority of households privacy is an issue, especially for women, during the flood period when compared to the non-flood period. Privacy varies depending on where women are living. Typically bamboo platform is put just outside the house and sometimes women are just forced to wade into the floodwaters and squat to defecate. This is mainly because finding a "private" open space often requires movement by boat to less flooded areas. Due to lack of privacy, women are sometimes forced to wait for long periods before being able to relieve themselves during the flood period. Despite privacy challenges no issues around harassment were reported. The situation is different for villagers who have flood shelters or those who take refuge in establishments such as schools and clinics that normally have toilets. The problem of latrines and open defecation practices highlight the need to explore and invest in low cost latrines suitable for these flood prone areas that have a very high water table.

Box 3: Coping with floods: successful case study of Gangi Jamuri village

"Every year we suffer the impact of floods in this village. We have experienced a major flooding in 1987, 2004 and 2007. It would appear the frequency is increasing. In 1987 the impact was severe, some people had to take refuge in trees in that mango orchard over there (pointing to the orchard) for about 10 days. During this time defecation and water was a problem but no lives were lost. Small livestock such as goats and chicken died. 2004 was more severe than 1987 as the flood water level was much higher. Only two homesteads remained safe. Again people moved to the orchard while some stayed in the government provided community hall. During this time all agriculture land was inundated and we had no access to labour opportunities. We took loans from others and from shops

and used floodwater for household purposes. Although the 2007 flood was severe, the impact was far less than we anticipated. We were informed earlier by the VDPC and prepared well in advance.

Around 50 households (300 people) 35 households used the flood shelters in our village and we had another 15 coming from the neighbouring village. A majority of the villagers did not need to move from their homesteads because their homesteads are on raised ground and did not need to move. We moved our livestock too although the shelter does not have a separate space for livestock. There were safety or security concerns in the flood shelters. Men slept on the verandah together with the livestock. Only women and children slept inside the flood shelter. We used the grains storage facility together with a local trader whose goods were also at risk.

Most families brought with them food to the flood shelter (grain rice) although this was not enough. Remember we told you that each family makes monthly contributions of Rs 5 every month in this village. We use this money to buy food for use during the flood period. This is coordinated by the VDPC. When it was finished we took loans from the shop with a small interest of Rs6 per month.

Our flood shelter has separate toilets for men and women, two-raised tube wells, one for drinking water the other for the latrine. Thanks to BSS and Oxfam support. The only problem is that this flood shelter does not have windows. It needs windows. During the flood period, the rains are continuous and we need to protect ourselves from the rains".

Coping Strategies

Knowledge of how vulnerable people respond to a threat is essential. External interventions can then build on these strategies. Household resilience is the ability for households to cope and recover from shocks or risks and stresses to livelihoods. It is therefore important to capture the types of coping strategies that community resort to when normal livelihoods options fail or are inadequate to meet household's requirements. These strategies are normally adopted in a predictable manner in an attempt to smooth consumption at the household level. It is not the intention of this review to go into the analysis of the sequence of coping strategies adoption.

Our survey data confirms that households in the RB programme areas adopt different coping strategies. Rationing food consumption (smaller portions and fewer meals) is an immediate response to austerity, and is adopted by 133 households in our sample: "*before these floods we normally have three meals a day. Now we eat once or twice a day, or at least limit adult consumption so that children can have enough food".* Other widely practiced coping strategies are taking relief, spending savings income and migration. The extent to which these household resource management strategies are implemented depends on the ability of the family to raise income from other sources.

Table 13: Household coping strategies

Coping strategy			Male headed		Female headed	
	N	%	N	%	N	%
Adjustment to number of meals per day	133	***64.3***	74	***69.2***	58	***58.6***
Men casual labour	41	***22***	23	***24.5***	18	***19.6***
Women casual labour	26	***14.4***	5	***5.6***	21	***23.1***
Sold poultry birds	1	***0.6***	1	***1.1***	-	***-***
Sold small livestock	4	***2.3***	2	***2.2***	2	***2.3***
Sold big livestock	13	***7.3***	10	***11***	3	***3.4***
Taken relief	100	***50.8***	51	***51.5***	48	***49.5***
Begging	8	***4.5***	40	***43.5***	42	***46.7***

Migration	82	***45.1***	40	***43.5***	42	***46.7***
Spent income from savings	86	***46.2***	51	***52***	34	***39.5***
Other	52	***32.9***	28	***35***	24	***30.4***

There is some evidence to show that the impacts of flooding within the household are gendered, in the sense that women and men take the strain in different ways. Asked whether floods affects women any differently from men, all participants in a mixed seasonal group discussion answered in the affirmative, and some argued that floods affects women and children more severely when compared to men: '*we care for children and since flooding affects the availability of milk it becomes difficult; women have to walk long distanced to fetch water if the source of clean water gets inundated, and some husbands migrate, leaving women not only to take care of children but also to provide for the family and ensure it copes during and recovers the flooding".* The reason why men migrate during difficult time may be in the best interests of the family – to provide for the household. Nonetheless, a major consequence of men's absence is increased pressure on women, who necessarily take on additional responsibilities to provide for all households members left behind while waiting for remittances.

Box 4: Household coping strategies

'What we did during the flood, was cutting down on the number of meals we are: we reduced the number from three to two per day. We also reduced the amount of food we ate at each meal – for adults mainly but even for children in some instances'

'When things go realty bad we also have the option of moving animals to our relatives or friends in neighbouring villages where the flooding is not really bad. It is common for households to move their animals while they remain to protect their assets from being swept away in the floodwaters'

'We still help each other a lot. For example, if someone's homestead is destroyed, their family moves in with neighbors for a couple of days and they receive food during this period from the neighbours'

'In times of flooding, men migrate to other towns and states – looking for casual labour opportunities. My husband has been gone for six months now and I have to look after the children. So flooding and lack of employment opportunities in our village is increasing the burden on women. This is happening to other women as well'

Migration as a coping strategy

Although migration has always been a key factor of the rural economy in Bihar, it was clear during the evaluation study that many households are resorting to migration as a result of a heightened sense of vulnerability due to flooding. This is mainly in response to the need to repay debt that they would have incurred during the flood period and loss of employment opportunities due to recurrent inundation, sand casting and riverbank erosion. There was a glaring absence of men in the villages at the time of field visit – a result of migration. Our survey data indicates that between 60% and 80% of male members in particular have migrated in search of work in nearby local towns and cities as well as other states. Migration is mainly in search of unskilled labour markets.

Loans

As highlighted elsewhere in this report, after losing assets to flooding, the poor are left with no option but to borrow and take loans to meet their consumption needs. This is one of the most important coping strategies that the households are engaged in. However as a result of interest rates charged on the loans, some families are never able to recover and accumulate enough resources to bring themselves to a sustainable status. In effect, this amounts to a 'debt trap', which is difficult to escape. Income from outside brought in as remittances is important in providing cash and other assets that are vital for repaying debts and loans.

Recovery from Floods

Flood recovery is one of the key considerations in the community. The previous sections of the report have discussed issues around preparedness, impact of floods and coping with floods. This section tries to build an understanding of how the community recovers from floods. Flood recovery is taken to mean the rate of return from where flood impacts are visible to a normal pre-flood situation. It is associated with the speed of reconstruction.

What recovery means for the community

Different households have different ways of defining what they mean by recovery for them. It was observed that recovery generally meant regaining access to employment as before the flood and returning to normal food consumption patterns. Consequently the recovery time frame varied depending on what it meant for that particular household. The most commonly cited recovery indicators include being able to have normal meals and availability of employment opportunities, *"before the flood season, I am able to get employment opportunities and feed my family, but during the flood season, I cannot lead my normal life but now, almost 4 months after the flood, I am able to feed my family and get some casual labour opportunities".* Another respondent indicated that, *"during normal times, my family eats three times a day and during the flood period we reduce the number of meals. When my income earning capacity gets back to normal and we are able to eat three meals again, then I can say I have recovered".* Some families indicate that it takes around six months to recover from the floods. Borrowing was highlighted as one of the recovery strategies for some families.

Recovery/Reconstruction time frame

The flood recovery time frame varies from one village to another, but the recovery phase is typified by some sense of normalcy in the community and, reconstruction can often last several years and is characterised by rebuilding infrastructure and community livelihoods in the village. The recovery and reconstruction often overlap because of the annual nature of flooding. Some households are not able to get back to normalcy before the next flood. It is in this regard that one can say that a majority of households rarely go beyond the recovery phase to complete reconstruction.

For households that mainly rely on agriculture as their main source of livelihood, recovery is not until the next harvest if they are able to reclaim their land and plant some crops. This means that recovery is not achieved until they harvest their wheat and other crops in April/May. However, the recovery timeframe is much longer for households who cannot immediately reclaim their land due to heavy erosion and sand casting. For these communities recovery can be anything from 3 – 5 years before they can start using their land productively again, hence they run the risk of falling deeper into vulnerability.

Recovery for households who largely depend on animal husbandry can be anything between 1-3 years depending on the level of livestock losses incurred. In most cases poor households are forced to take loans for livestock re-stocking. It is this 'flood-credit' that they find most difficult to repay and often results in longer recovery timeframe. The recovery timeframe also varied between male and female-headed households. To illustrate, one male-headed household indicated that they took a loan to buy an oxen and it would take them 1-2 years to pay back while it takes 2-3 years for a female-headed households to repay a loan taken to buy livestock. In this regard, it is plausible to indicate that the recovery timeframe varies from one household to another and there is no clear/fixed recovery timeline for the community.

To sum up: adequate household assets and supportive social relations are necessary to recovery. The 'access model', which helps to analyse the access to capabilities, assets and livelihood opportunities, is key in understanding how people reduce their vulnerability. There is need to focus and understand on the role and agency of people, the impact of hazards and how they cope and develop recovery strategies whilst interacting with the external environment and other actors. However, for a majority of households the first two years after a big flood are difficult often characterised by repeated seasonal stress, causing reduced crop/agricultural and livestock output thereby prolonging the recovery period.

Sectors needing recovery support

Shelter/Housing construction: The annual floods often result in the loss of homes of the affected and most vulnerable families. From the SSIs it was established that one of the sectors requiring recovery support is shelter. One of the primary reasons why shelter is such a key recovery/reconstruction priority is that the flood season is immediately followed by the cold/winter season and as such people would require appropriate shelter to protect them from the cold. Although it is glaringly clear that shelter is one of the key requirements for recovery, there is an apparent lack of support in this sector.

Water and Sanitation: As the floodwaters recedes it leaves behind contaminated tube wells and collapsed latrines. There is an apparent need for communities to be supported with water and

sanitation facilities where these have been destroyed in view of increased open defecation practices. As indicated before, such interventions need to be locally appropriate taking into consideration local perceptions and prevalent sanitation practices and needs.

Recovery support provided

Livelihood support was provided to some families in villages and also as part of support. Vending support is also provided. Oxfam supported interventions were observed in villages such as Radhanagar. Vulnerable families received livelihoods support in the form of buffalos and these were targeted through a community-based approach i.e. the involvement of villager in the identification of beneficiaries. Some villages such Karnpur reported receiving seed support. Recovery support provided however remains very limited and the community largely relies on their own coping mechanisms during the recovery phase. Distribution of seeds as recovery has been criticized mainly for two reasons. In most cases this support has not been enough to cater for huge needs of the community. Furthermore it is not based on a clear analysis of the real needs leading to supplied that are not relevant especially considering the limited landholding size of the affected populations.

Government also provides ***housing reconstruction*** support to vulnerable households affected by flooding through the IAY scheme. However, the level of support provided is not sufficient to meet the needs of the affected communities. The programme is directed to the very poor and probably succeeded in this targeting because of the level of support provided for the less poor people to be interested. Similarly government supported schemes such as the National Rural Employment Guarantee Schemes (NREGS) were not widespread enough to cover the needs of the community. Support for paid labour in re-construction works has the potential to enable poor households to manage without taking loans.

Crosscutting issues

Coordination

Coordination of activities is key to ensuring that the success of the RBP programmes. Coordination was investigated at the different level i.e. during the flood period and during the non-flood period. Discussions with the Block Development Officer (BDO) in Sitamahri block highlighted the fact that coordination activities need to be strengthened. It was noted that there is very little coordination between the NGOs and the local authorities and this has often resulted in the overlap of activities during the relief phase in particular. The Sub-Divisional Officer (SDO) who indicated that there are some cases of double dipping of relief assistance echoed the same sentiments. Similarly there is general lack of awareness on the activities that the local NGO partner organisations are engaged in a part of the ongoing disaster preparedness activities. As a result of the disconnect between the local authorities and NGOs activities there is very little pre-flood planning coordination between the government and the local authorities.

Accountability

Although no specific work on downward accountability has been initiated for the RBP programme, there was generally high interest among local implementing partners' staff generated through their participation in the evaluation study. Issues on how the community can hold the local NGOs accountable of their actions were spontaneously raised in FGDs and SSIs. Similarly the local communities have ideas on how to improve things either through their participation in government and NGOs projects but there is a feeling of a top down approach being followed. This highlights the need for more communication at all levels.

Conclusion and recommendations for programming

The main output of this evaluation study is to make a series of recommendation that will help Oxfam (India) Trust and its RBP partners to improve their disaster risk reduction interventions and making it more responsive to the community needs. This section of the report summarizes some of the key recommendations from in the evaluation study areas as defined by the study objectives, analysis of the impact of flooding in order to facilitate the development of the RBP into a forward looking strategy.

Integrated model for disaster management

The current model RBP model seems to be focusing more on relief, preparedness and mitigation. The application of this model is not being holistic. There is need to for a shift and adoption of an integrated model for disaster management. It was evident that in areas such as Sitamahri and Benipatti the programme has less focus on structural disaster risk reduction measures compared to Bisfi and

Andrathadi blocks. A comprehensive strategy should be applied in all the areas experiencing recurrent disasters integrating combining both structural and non-structural measures into an expand contract model which sees disaster management as a continuous process with a series of activities that run parallel to each other rather than as a sequence. This means that there is need to scale up activities in communities where a holistic approach to disaster management has not been fully adopted. Activities that can be implemented such as advocacy, flood shelters, grain storage facilities, raising of homesteads and capacity building of VDPCs can be accelerated.

Capacity building for integrated disaster management
Although the evaluation study did not conduct a detailed capacity assessment of implementing partners' staff, it was apparent that there is still a skills training gap that exists in risk assessment, risk reduction measures, community/social mobilisation and related subjects. Clearly if staff are to facilitate disaster management training for community based disaster management and succeed in making disaster preparedness action plans more responsive to the needs and the community, then the staff involved need to be aware of the techniques and approaches.

Capacity building initiatives should also be extended to the local communities particularly the VDPC members in key areas of disaster risk management. It was clear during the evaluation study although VDPCs have been formed in some communities; this has not been followed with proper training and articulation of their roles and responsibilities.

Capacity building and straining support should also have a ***gender focus*** – this needs to be acknowledged as an essential component of all disaster preparedness/management work at all stages, and be required of all staff irrespective of their sectoral focus, in order to develop an understanding of gendered roles, responsibilities, vulnerabilities, priorities and opportunities before, during and after flooding.

Access to formal credit facilities
Villagers in the study area raised issues related to lack of access to formal credit facilities, the absence of functioning institutions. This has impacted negatively and increased their vulnerability to flooding as many situations they have to rely on informal credit systems (e.g. moneylenders) incurring huge interests in the process making it difficult for them to recover from the impact of flooding. One of the most one of the most effective ways of building more resilient communities is through micro-credit schemes in order to stimulate disaster recovery and the reconstruction of small enterprises. This will help reduce the risk of taking credit for the poor. Critical recovery services such as access to credit facilities are absent and need to be considered as part of an ongoing livelihood intervention in the study areas. The formation and support of loans and savings group could be one way of encouraging families to save for emergencies. Good practice examples of community organisation should be explored and replicated.

Suitable options for agriculture in flood prone areas
Agriculture is the primary and major occupation of the villagers either directly or indirectly. However, this sector is heavily affected during with continued flooding. A majority of households are not able to revert to their normal agriculture practices immediately after the floods either because they would have lost land due to sand casting or they cannot plant their usual crops on the fields. In view of the normal interruptions in the agricultural season, there is need to look at ways of improving or making available alternative options to agriculture in the flood prone areas including appropriate seed preservation methods. Preparedness in agriculture in terms of crop selection, alternative farming practices/techniques need to be considered as part of the RBP programme.

Management of livestock to reduce risk
Livestock (large and small) are very important assets for the villagers in the evaluation study areas and a major source of income. Rearing cattle is an important economic activity for sale of milk and draught power while. Sale of poultry is also an important source of income especially for women. The animal husbandry sector incurs losses as a result of high mortality of livestock either due to disease and being washed away during and after the flood period. This is partly due to lack of fodder management and little/no access to animal vaccination. To address this, it is recommended that the RBP identified and develops options for improvement of the animal husbandry sector in flood prone areas. Such interventions may include organizing vaccination campaigns during the pre and post flood period, provision of fodder and the identification/construction of livestock shelters in high flood prone areas.

Strengthening of local coping mechanisms
The nature of disaster risk reduction activities requires that existing livelihood systems be identified and strengthened as part of a community based approach. For example promoting indigenous crop diversification, in particular of rice varieties would be an example of this approach. During the evaluation study it was clear that self help and solidarity of households was an important factor in responding to floods. Therefore any development/intervention that hampers or undermines this structure will inevitably increase the vulnerability of the community. Most of the villages that were visited had technical resources such as voluntary veterinarians and village health works. However, these resources were not being adequately used in most villages. This highlights more engagement with people's existing capacities, resources and social capital.

Advocacy
The RBP is operating within an environment where some of the natural causes of flooding interact with largely manmade causes e.g. poor maintenance of embankments, inadequate relief and recovery support being provided by the government among others. For example in Sitamahri, Benipatti, Bisfi and Andrathadi blocks, thousands of acres of cropland and houses were inundated due and destroyed due breaches of poorly maintained embankments and canals. Oxfam (India) Trust and its RBP partners can provide support to the affected people to voice their concerns over lack of proper maintenance of infrastructure that is supposed to provide protection from the impact of flooding and, to see that their demands in terms of relief and recovery needs are adequately met. In view of the above consideration there is need to seize the advocacy opportunities that flood relief provides on an annual basis to shine it towards the root causes of flooding.

Linkages with the local authority and government structures
There is need to establish mechanisms for linking the RBP programme activities with local and government structures. Presently there is very little coordination between the government and the RBP partners.

Exit strategy
The RBP programme had been implemented for more than three years in some villages with no clear strategy for exit in place. The programme needs to develop exit criteria to allow for phasing out and targeting of new communities. Exit strategies should fit into the regional RBP strategy across the participating countries (India, Nepal and Bangladesh).

Annex 1

Hazard assessment in Murahi Tolla village Sitamahri block

Hazard	Flooding & water logging.
History	The village has always experienced a small flood every year with intermittent big/heavy floods.
Frequency	Every year normal flooding that comes and goes during the monsoon season, a big flood every three years.
Speed of onset	Indication over period of months. Often slow during a normal flood but so sudden during a big flood depending on the cause. Sometimes there it takes about a week of heavy rains before it starts flooding and it takes only a few hours to flood the village depending on where the embankment is breached.
Location	Sitamahri, Madhubani district
Duration	2-4 months
Severity	Considered to be very serious. Damaged houses, food shortages, vital assets lost, livestock swept away.

Seasonal Calendar in Murahi Tolla village

Type of activity	Months	Jan	Feb	Mar	April	May	June	July	Aug	Sept	Oct	Nov	Dec
Seasonality	Rainfall												
	Cold season												
Hazards	Floods												
	Malaria												
	Diarrhoea												
Activity	Planting												
	Harvesting												
	Crop irrigation												
	Wheat growing												
	Out-migration												
	In-migration												
	Livestock births			Goats					Cows/buffalos			Goats	
	Animal disease												
	Fodder						Less available					Most available	
	Food Availability Difficult												

N.B Yellow shade indicates the period during which the activity takes place

Notes

1. Demand of labour is high during the period June to July as this coincides with the planting season.
2. Jan/Feb/March is commonly a wheat-planting period. During this period repair/reconstruction of houses destroyed during the flood period is done. This is also done a part of preparations for the monsoon season.
3. The occurrence and incidence of diarrhea and malaria is associated with the flood period.
4. Planting normally takes place during the period April/May. Replanting is done mid September if the crop is destroyed during the flood season.
5. In and out migration is not only associated with the flood season but also with religion. Male migrants tend to make sure that they return during important festivals e.g. out-migration high after festival of Holi, while in-migration is high during the festival of light.
6. Animal disease is high during the flood and rainy period and during the cold season animals reportedly die as well.

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