Oxfam

Introduction to Community-Based Water Resource Management: A Learning Companion

Oxfam Disaster Risk Reduction and Climate Change Adaptation Resources

1. About this Companion

This Companion aims to support Oxfam staff to implement community-based water resource management (CBWRM). CBWRM is most appropriate for field programmes in dryland areas, but it can be applied in any context where scarcity of domestic or productive water is an issue.

The CBWRM approach is conceptually aligned with Disaster Risk Reduction and Climate Change Adaptation, and as such this Companion forms part of a series of resources on adaptation and risk reduction. It should be read alongside the Disaster Risk Reduction Programme Policy and the Climate Change Adaptation Programme Policy Guidelines, and also the Introduction to Disaster Risk Reduction and Introduction to Climate Change Adaptation[1], which provide definitions, key terminology and concepts. This Learning Companion assumes you already have an understanding of project cycle management within Oxfam. If you would like more information on this, please contact phd@oxfam.org.uk.

Learning Objectives

After reading this Companion you should:

- have a basic understanding of practical CBWRM, and be familiar with key activities that can be implemented within field programmes;
- understand how CBWRM can form an integral component of ARR;
- understand the importance of linking water availability, access and demand when managing water scarcity at community level; and
- understand how CBWRM can both operationalise and influence national-level integrated water resource management approaches.

2. Why is community-based water resource management important for Oxfam?

More than one billion people worldwide do not have access to clean, safe water[2]. This has a severe impact on those living in poverty as it can result in insufficient household supplies for drinking and sanitation (domestic use), and inadequate provisions to sustain crops or livestock (productive use). Water scarcity can, therefore, affect health, food security, economic activity, environmental wellbeing, and can also exacerbate civil strife or local conflict. Managing water resources effectively is fundamental to ensuring the supply of water on which people's health and livelihoods depend – now and in the longer term.

Climate change is already affecting water resources and water supply throughout the world, and will increasingly do so over the coming decades, adding to the existing and growing causes of water scarcity caused by variable rainfall patterns (climate variability) and increased water demand due to population growth, urbanisation and higher demand for food production.

Community meeting at one of two fishponds fished on by villagers from Newari and Khop, Chattarpur, Madhya Pradesh. Photo: Rajendra Shaw/Oxfam

Key Terms

Climate change is any change in climate that persists for decades or longer, arising from human activity, that alters the composition of the atmosphere (i.e. greenhouse gas emissions).

Climate variability describes natural variations in the climate that are not caused by climate change (e.g. it rains more in some years and less in others).

Domestic or household use of water refers to supplies consumed or used within the home to meet basic health, sanitation and hygiene needs.

Groundwater Wells and aquifers (underground rock layers containing water resources) which yield water from beneath the earth's surface are referred to as groundwater sources. In arid environments, groundwater is an attractive option for water supply as it is often cheaper to develop relative to other alternatives, aquifers offer more natural protection from contamination, and groundwater offers more reliability of supply against climate change and existing climatic variability.

Productive use of water refers to supplies utilised to sustain crops, livestock or for manufacturing, which produce an income.

Vulnerability refers to the characteristics and circumstances of a community, system or asset that make it susceptible to the harmful effects of a hazard – in this case, reduced availability of water. The main determinants of vulnerability are the social, economic, political, governance, environmental and ecological factors that characterise how well people can adapt to, prepare for, cope with and recover from stresses or shocks.

Water scarcity results when available water resources are insufficient to meet the household and productive demands of the communities they support.

Water stress Households or communities which are vulnerable to water scarcity can be said to be experiencing water stress.

Oxfam has a long-established reputation for delivering effective water supplies to communities during and after emergencies, and is increasingly focusing on water provision for both productive and household use. CBWRM fits in with this because it aims to operationalise water resource management at a community level, in support of national or regional water resource management programmes.

3. How does community-based water resource management link to adaptation and risk reduction?

Climate Change Adaptation and Disaster Risk Reduction are organisational priorities for Oxfam. Communities living in poverty are often highly exposed to natural hazards such as drought, floods and cyclones. Climate change is increasing the frequency and/or intensity of these hazards in many places. In addition, climate change also causes gradual changes (e.g. increased temperature, saline intrusion, changing timing of seasons, and changed patterns of rain within seasons), which undermine the livelihoods of people living in poverty. For example, households that rely solely on rain-fed agriculture are likely to be more vulnerable to drought than households with more diverse livelihood options. Enabling poorer communities to manage their water resources is therefore an important component both of reducing the risk of disasters and of adapting to climate change. CBWRM links to ARR because the approach explicitly includes facilitating communities to assess and manage the risk of water scarcity. ARR requires flexible approaches such as CBWRM because the exact impact of climate change on water resources at the scale at which field programmes operate is not known with any certainty (and, for technical reasons, cannot be known with absolute certainty).

Water resource management at the community level focuses on reducing vulnerability and building people's capacity to adapt to multiple complex risks. CBWRM compliments ARR approaches because it:

- can support the local implementation of national water resource management policies;
- encourages people to identify and manage risk to water resources;
- identifies risks related to water resources and water supply systems, and analyses the effect of climate change and/or climatic variability on these;
- promotes flexible contingency planning to mitigate risks;
- integrates understanding of local-level hydro-geological and climatic contexts into existing humanitarian and development programmes; and
- involves practical engagement at the community and district level, as well as advocacy at regional and national levels.

Example: Water Supply in Chronic Humanitarian Emergencies

In emergencies where large-scale human displacement occurs, dense populations in Internally Displaced Person (IDP) or refugee camps place significant demands on available water resources. Water demand in IDP camps can be more like those of a city than a rural setting: when designed to Sphere standards, population densities in camps may exceed 22,000 people per km2 and daily groundwater abstraction requirements may equate to 330m3 per day per km2, if 15 litres per person/per day are achieved. Such high demand can threaten the medium- and long-term functional sustainability of aquifers, as well as water supply infrastructure.

IDP camps and urban settlements in Darfur have experienced water stress due to groundwater depletion. This is a result of:

- dense populations
- low and variable rainfall
- poor aquifers underlying camps, with poor permeability and storage properties
- multiple water usage demands
- insufficient medium- and long-term planning

Community water demands also include livelihoods – even in emergencies, though programme implementers sometimes neglect this consideration. In Darfur, irrigation systems, home gardens, livestock watering, brick making and water vending all accounted for productive uses of water. When planners fail to consider these multiple uses, the sustainability of groundwater sources and the mechanical hardware installed can be jeopardised (e.g. failure of pumps through prolonged pumping). Groundwater depletion and mechanical failure of pumps may lead to people, normally women and children, having to access water from distant, unprotected water sources. This may pose not only health risks but also, in a context like Darfur, an increased risk of violence.

The same water resource management considerations also need to be applied within a rural development context. Inappropriately planned irrigation systems, for example, may encourage high groundwater or surface water abstraction, and so may inadvertently undermine domestic water supplies in the attempt to improve food security.

Abu Shouk and Al Salaam IDP camps (107,000 IDPs in a densely populated camp located on the edge of a desert, adjacent to an existing town). Photo: Oxfam

4. What is community-based water resource management?

In its simplest form, water resource management requires a balance between water supply and demand. If demand (in all its forms) outstrips supply, then depletion of water resources – water scarcity – will occur. CBWRM is a valuable way to ensure community water supplies remain sustainable, because it places emphasis on assessing and monitoring available water resources by communities themselves.

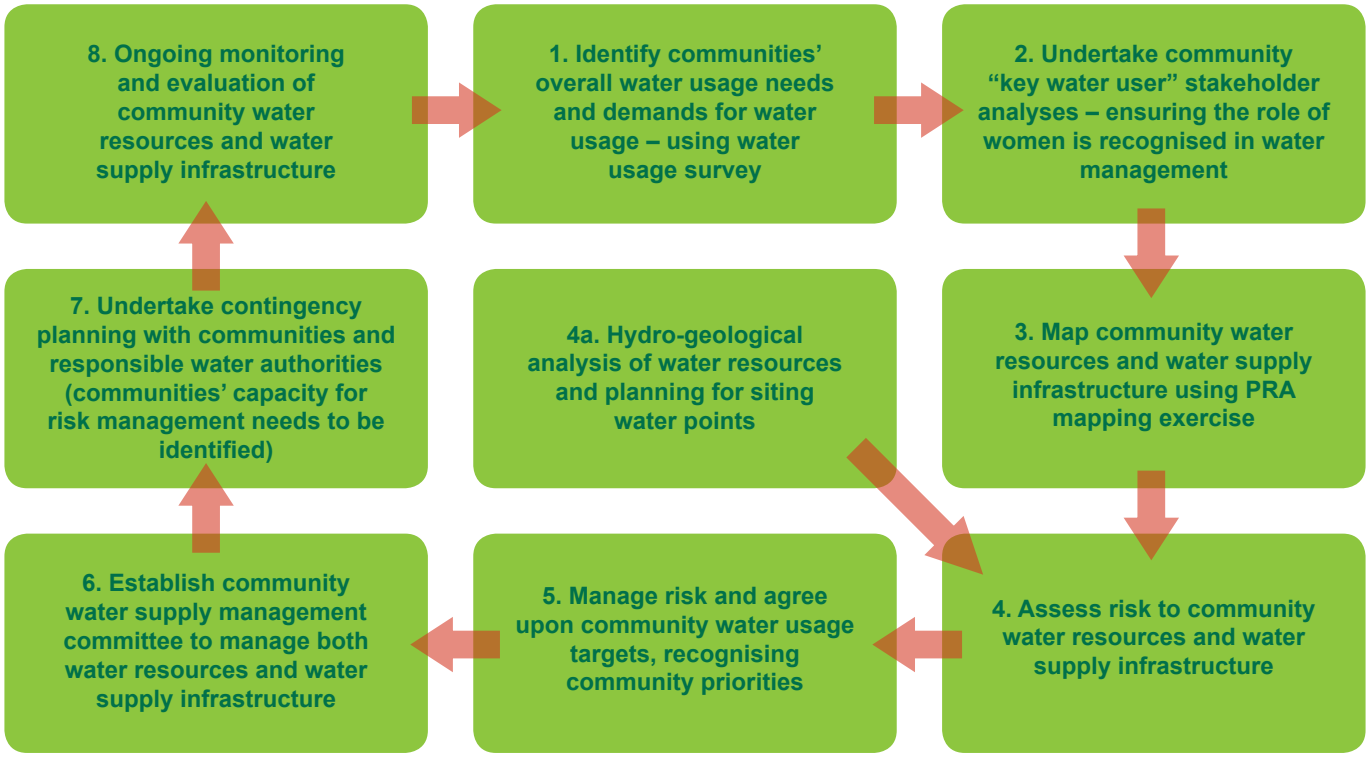
The aim of CBWRM is to identify and understand how water scarcity affects water availability, access and demand at household level, so that communities' and households' adaptive capacities can be strengthened through planning.

Successful CBWRM projects are based on:

- an understanding of how climate variability, droughts and floods affect water availability and access, and how this might change in the future due to climate change (see the Introduction to Climate Change Adaptation Learning Companion for further information);
- identifying and managing risks to water resources;
- comprehensive contingency planning;
- a thorough analysis of gender relations and inequalities to ensure CBWRM projects take into account the different needs and perspectives of men and women, do not harm or exclude women, and help redress any existing gender imbalances;
- an understanding of the links between food security and water security at community level;
- improved water resource assessments and hydrological analysis when siting water sources (wells and boreholes);
- engagement and collaboration with both communities and local authorities from the outset of the project;
- continued monitoring of water resources to enable programme re-examination and adjustment;
- budgeting for basic groundwater monitoring equipment and rain gauges, flow meters for boreholes, groundwater dipper tapes, staff gauges to measure surface water levels;
- technical coordinators ensuring project staff have the skills and training required to implement CBWRM or know where to go to receive support; and
- advocating for communities to have access to and influence upon higher-level institutions and decision-makers.

These key considerations are reflected within the **CBWRM model** across eight key stages shown below:

Many of these programme steps can be incorporated into existing field assessments such as participatory capacity and vulnerability assessment (PCVA) and community-based disaster risk management (CBDRM)[3] or implemented where water resources emerge as a priority in other risk analysis processes. As with PCVA, the approach should be repeated as appropriate (e.g. annually or seasonally, if there is high variability between dry and rainy seasons).



Stage 1. Household surveys: understanding water availability, access and demand

Undertake a household water usage survey with community members. This is designed to help Water, Sanitation and Hygiene (WASH) practitioners and communities to identify (collectively) water availability, access and usage, including seasonal variations that may occur. The water availability, access and demands of women should be explicitly recorded.

To ensure that community groups take ownership of CBWRM, they must be involved from Stage 1 to plan activities and allocate responsibilities, particularly where traditional systems of water management are already in existence.

Stage 2. Stakeholder analysis

Conduct a stakeholder analysis and identify key water user groups that may engage in water management. This, typically, may include productive water users (such as farmers, pastoralists, and brick makers), community leaders, and women.

Stage 3. Mapping community water resources

Create a map of available water resources (aquifers) and water supply infrastructure (i.e. hand pumps). Maps are an excellent means to facilitate discussion and undertake local-level water resource planning with local authorities and communities – with women's input (often in separate groups) essential. Staff should aim to use mapping to step back and facilitate planning, rather than imposing our own plans. Mapping is a key activity in CBDRM, and water resource mapping should be undertaken as part of, or in follow-up to, PCVA.

Stage 4. Risk assessments of water resources

Assess risk for both water resources and water supply infrastructure (assets). This will require pump testing of boreholes if drilling records are not available. Risk can be assessed under the headings of water: quantity, quality, access, safety and security, functional sustainability, and ownership. Again, specific risks to women need to be identified.

Stage 5. Manage water risk

Identify water-related risks to be managed or mitigated by drawing up a community water management plan to address priorities of different groups. Again, this can be done as part of or subsequent to other community analysis and planning processes (CBDRM or community-based adaptation plans). This requires priorities, roles and responsibilities to be collectively agreed between men and women in the community, local water authorities, and Oxfam staff.

Stage 6. Capacity development

Develop the capacity of management structures as appropriate. This may involve communities and local water authorities, as agreed in the management plan established in Stage 5 and should include scenario planning[4] based on identified and uncertain risks. Membership of management structures and capacity development should be prioritised for women where possible.

Successful CBWRM will result in communities having the formal skills and ability to monitor water usage as part of their daily activities. These CBWRM activities can include:

i) improved groundwater assessments to ensure boreholes are sited in productive areas of aquifers;

ii) monitoring borehole yields and demand at point sources; and

iii) measuring annual rainfall patterns, routinely measuring groundwater fluctuations to understand groundwater recovery or depletion, and measuring collective water usage using water usage surveys[5].

Activities that encourage community participation will compliment and strengthen the development of contingency plans and will help create mutual respect with water authorities.

Stage 7. Contingency planning

Encourage broader contingency planning for drought and flood between neighbouring communities, local water authorities, and Oxfam. This may include drilling of relief boreholes in productive aquifers near villages that can be uncapped and utilised during periods of drought.

Stage 8. Monitoring and evaluation

CBWRM requires community-level monitoring and evaluation to be undertaken by all stakeholders (communities, district water authorities, and governments) and used to assist planning and management of water resources. Local-level information is central to CBWRM programming, both to identify available water resources and to review the impact of subsequent interventions.

It is critical that the implementation of this stage is based upon a thorough gender analysis, such that monitoring and evaluation takes the needs and perspectives of both women and men into account, does not exclude or harm women, and helps to redress some of the existing gender imbalances within communities.

Opposite: Al Salaam IDP Camp, El Fasher, Darfur. Mapping exercises undertaken in Darfur demonstrate that community groups have the knowledge and skills to map water resources and water supply systems in great detail. Physical "community water resource maps" are an effective "facilitation tool" and may be used to plan CBWRM activities.

Integrated water resource management: bridging the gap between water and livelihoods in Niger

Oxfam's involvement in Niger began in 2005 during a period of drought and famine. The response focused on two areas: Dakoro, a pastoralist area in the north of the country, and Tillaberi, an agro-pastoral area in the west. While the initial response focused on the Emergency Food Security and Livelihoods (EFSL) team and was led by experts in agriculture and nutrition, programme teams rapidly realised that water was a crucial issue since it was used for human consumption and to sustain livelihoods.

In Dakoro, the programme aimed to avoid interfering with the pastoral communities' traditional movement patterns, and used the location of current wells as the basis for intervention. It was critical to develop methods of drawing water that could bring a high volume adequate for both livestock and human consumption. Large-diameter wells were used to enable the use of larger containers and to enable many people to draw water at the same time. The use of draught power to draw water was also maximised, while avoiding contamination of the wells with animal faeces.

In Tillaberi, the programme started by digging deeper wells to meet human requirements and installing hand pumps. However, these wells were only able to provide enough water for human consumption and did not take into consideration the high demand for water from livestock, which is considered equally important by pastoral communities. The programme then developed a cash for work initiative to de-silt and enlarge surface pans, which ensured a more secure water source for livestock. Following rain, there was enthusiasm for utilising the larger quantities of water that were now stored, and the programme embarked on an agricultural development programme, providing seeds and using the water dams for irrigation.

At this point, the programme strategy was re-evaluated and a commitment to implementing a water resource management approach was made. This involves an internal commitment to invest in long-term programming in non-emergency contexts, with the aims of increasing communities' resilience to hazards while at the same time building Oxfam's organisational capacity to respond to emergencies.

Opposite: Groundwater measurement in Niger. A woman measures groundwater levels using a dipper tape. Traditional hand pump designs are "sealed" and may exclude communities from measuring groundwater levels. However, communities have often informally observed groundwater levels to determine variation between dry and rainy seasons, and hand pumps can easily be modified to allow more accurate measurement of these levels.

Remember to:

- **Involve community members:** Households and community members will be able to monitor water usage and demand as part of their daily activities. Monitoring indicators must reflect people's priorities for water usage, rather than imposing external monitoring criteria, which may not reflect people's priorities. Women, men, girls and boys must be involved in this data collection, to ensure that different opinions are heard.
- **Collect the right information:** Key monitoring requirements for CBWRM should include annual rainfall volumes, yield from springs and boreholes in relation to demands, groundwater level fluctuations, water quality issues, and the functional sustainability of water supply systems. The collection of local-level hydrological data will compliment broader integrated water resource management (IWRM) plans.
- **Incorporate a few SMART indicators:** CBWRM should form part of a broader programme approach; so a number of indicators should be selected that will compliment other sector activities.
- **Increase communities' capacity to use, analyse and respond to information:** Information collected should be shared with women and men in communities so they are better informed and may make appropriate changes. Remember to include groundwater data, which is often not considered because water levels are not visible in boreholes. Collected data must be used to enable communities to make informed decisions to prevent localised depletion of water sources and to prevent mechanical failure of pumps and infrastructure.

5. How is water resource management approached on a larger scale?

Up until now, this learning companion has focused largely on working at the community level. However, water management at the community level is always part of a larger set of knowledge, practices and policy. CBWRM needs to be linked and consistent with (and able to influence) this broader context if it is to become sustainable in the longer-term.

Water Safety Plans and traditional community water supply management

The CBWRM model is derived from water safety plans (WSPs), a comprehensive approach to the assessment and management of risk that encompasses all steps in the water supply chain, from catchment to consumer, in order to ensure the safety of drinking water throughout. WSPs are now an integral component of the World Health Organization's (WHO) guidelines for drinking water quality. For more information about WSP's please go to http://www.who.int/water_sanitation_health/dwq/wsp0506/en/index.html

While WSPs are a useful tool through which to approach CBWRM, research undertaken by Oxfam in Darfur and Niger, identified that communities that remain on the periphery of assistance from central governments often adopt their own systems of water management.

Informal mechanisms for water resource management that were observed in these countries included:

i) Communities regularly observed and recorded rainfall patterns, groundwater and surface water levels

ii) Communities had indigenous knowledge of local water resources and possessed the ability to map local water sources in great detail

iii) Communities maintained a willingness and interest to engage in water resource management, recognising its importance in their lives

iv) Livelihood groups established mechanisms for conflict resolution to improve water resource management and ensure equity during times of water stress and hardship.

Integrated Water Resource Management (IWRM)
IWRM has been recognised as the mechanism for managing water and land resources since the 1990s. It is enshrined within the guiding Dublin Principles (1992) that state:

1. Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.
2. Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.
3. Women play a central part in the provision, management and safeguarding of water.
4. Water has an economic value in all its competing uses and should be recognized as an economic good.

IWRM is a broad and complex process that requires full government support and political will, widespread communication among all stakeholders, and multi-stakeholder partnerships. An emphasis on downward accountability is required, and ultimately IWRM should become effective at addressing local-level issues. However, many IWRM initiatives remain at the large scale of national policies and river basins, with little benefit reaching vulnerable households.

The recognised challenge for IWRM is to move from a set of enshrined principles to a level of practical operation that can address complex issues at community level. More recently, many practitioners have called for IWRM to take a local approach that engages with the Water Sanitation and Hygiene (WASH) sector. This could take the form of CBWRM operating at district and community level in support of broader regional and national-level IWRM approaches.

Advocacy as an essential part of CBWRM
One requirement of CBWRM is to include advocacy so that communities have access to and influence with higher-level institutions and decision-makers. Field-based advocacy is an important mechanism for positive change. Humanitarian, development and campaign programming should: i) influence water policy so that it remains realistic to the needs of communities; ii) assist communities with the management of water resources, as part of broader IWRM plans; iii) ensure communities have access to and influence with water authorities and decision-makers so that support and contingency plans can be developed. A useful test of CBWRM advocacy outcomes lies in the answers to the following questions:

- Are field programmes actively engaged in water resource management, and are learning experiences documented?
- Does mutual respect exist between communities, social groups and water policy decision-makers?
- Do communities have access to and influence over decision-makers?
- Do our practical engagement in fieldwork and our relationships with communities and governments provide us with the authority to advocate and influence policy?

6. Key learning from this Companion

- Extending access to water is central to building household resilience to climatic vulnerability in many contexts.
- Improved access to water depends on sound water resource assessments and a better understanding of geology and groundwater recharge processes.
- CBWRM should help create mutual respect between water authorities and communities. This should result in groups in society having access to and influence over decision-makers.
- Community groups, who have remained on the periphery of assistance from governments, often have established traditional mechanisms for managing water and land resources. These traditional informal mechanisms should not be overlooked and should be respected.
- CBWRM requires a balance between water supply and demand in order to avoid water scarcity due to changing social, economic, ecological or environmental contexts – particularly changes caused by vulnerability to disasters or climate change.
- CBWRM forms an integral component of broader national IWRM approaches and enables IWRM to become operational.

Using the fertile, dried up sides of the fish ponds, to grow crops (wheat, mustard, vegetables) in Bir Sagar tank, Dhuklai village, Tikamgarh. Photo: Rajendra Shaw/Oxfam

Oxfam GB is beginning a collaboration with WaterAid to establish a series of CBWRM pilot programmes in West Africa, Southern Africa and South Asia. This collaboration will lead to operational water resource management being undertaken in an increasing number of field programmes. Experiences will be documented to improve learning and better establish CBWRM. Expressions of interest are invited from country programmes and field staff wishing to know more about CBWRM.

7. Further reading

Abarquez, I. and Z. Murshed (2004) *Community-Based Disaster Risk Management – Field Practitioners Handbook,* Bangkok: Asian Disaster Preparedness Center (ADPC).

Carter, R.C. (2007) 'Rapid assessment of groundwater opportunities for displaced and refugee populations', *Waterlines* Vol. 26, No. 1.

Day, S. (2009) 'Community Based Water Resource Management', *Waterlines: Integrated Water Resources Management* Vol. 28, No. 1, p47–62.

Jembere, K. (2009) 'Implementing IWRM in a Catchment: Lessons from Ethiopia', *Waterlines: Integrated Water Resources Management* Vol. 28, No. 1, p63–78.

Van Koppen, B. (2007) *Community-based Water Law and Water Resource Management Reform in Developing Countries, Comprehensive Assessment of Water Management in Agriculture* series, Wallingford: CABI Publishing.

Notes

1. All of these documents can be found on the Oxfam intranet: http://intranet.oxfam.org.uk/programme/arr/overviewfolder/resources#disaster-risk-reduction
2. Source: World Health Organization, 2004
3. For more information on CBDRM, please see the Further Reading section at the end of this Companion.
4. Scenario planning is recommended to help field staff plan when multiple risks identified remain uncertain.
5. Water usage surveys are household surveys undertaken with community members. The purpose is to help people understand their collective water demand and identify challenges

Disaster Risk Reduction and Climate Change Adaptation are corporate priorities for Oxfam GB. The Learning Companions are a set of articles, which provide accessible and practical guidance to Oxfam staff wishing to integrate DRR and Climate Change adaptation approaches into programming. To find out about other resources on Disaster Risk Reduction and Climate Change Adaptation, and to give us your feedback on these resources, please contact the Programme Resource Centre. Email: phd@oxfam.org.uk

Front picture: Banibangou, Niger. The women belong to a gardening cooperative, one of the key water user groups Oxfam are working with to improve water resource management within the town. Photo: St John Day/Oxfam

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