

Type of adaptation action ¹	Title of adaptation action, including projects	Status of adaptation action - ongoing - under implementation - under development - under consideration	Needs in order to successfully implement the adaptation action	Concerns/ Barriers	Experiences/ Lesson learned	References i.e. publications, websites etc.
Scope of adaptation action						
<i>Local (community) level: Bangladesh</i>						
Technologies	Floating vegetable gardens; rafts made from local materials – bamboo frame, water hyacinth provides bed for soil. Seeds are planted during monsoon.	Under implementation	Training: input support – these are very poor communities, who have no income during flood season.	Concern: not suitable in dry season, so a source of income only for few months. Barriers: local materials not always available, if flood water destroys natural vegetation (water hyacinth); also if long dry season, these plants are less vigorous	Suitable for large areas of central Bangladesh, subject to regular flooding and river erosion, where many people have very small plots of land Useful source of income for a difficult lean season; Valuable for landless people, who can float the gardens on public land – ponds, borrow pits, river. Cost effective, as materials are free except bamboo.	http://practicalaction.org/?id=climatechange_floatinggardens

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- Some activities include a component of climate change adaptation, e.g. infrastructure replacement incorporating higher flood standards
- Some activities are not carried out for adaptation but have other objectives such as preserving biodiversity, however they can offer adaptation co-benefits, e.g. restored wetlands protect against storm surges.

	Gardens float in the river and ponds, when farmland is under floodwater.					
Practices	Tree planting of timber, and fruit trees that are flood tolerant, for flood prone homestead planting (mahogany; jamun, (syzium cuminii,)mango,)	Under implementation	Training; establishment of local tree nurseries by selected community members; links with markets; fencing against livestock	Concern: unusual rains can destroy beds of young seedlings Barriers: getting seeds of local (indigenous) flood tolerant varieties	Positive for villagers as people are aware about tree planting and its value. Additional source of income and employment for nursery owners (especially women)	
Technologies	Fish cage culture: 1m x 1m cages made locally in which fish fry are reared until mature. The cages are tethered in dug ponds which fill	Under implementation	Training for making the cages; purchase of fingerlings (although indigenous species can be caught for rearing).	Depends on getting access to a pond from the pond's owner, in return for rent. Access to water bodies for the poorest people is an issue in Bangladesh.	Women have benefited as they can manage the fish cages, whereas it is men who fish in the rivers.	http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=62

	during the monsoon, when fishing in rivers is unsafe due to heavy flows.					
Practices						
Technologies	Flood proof houses: raised on a cement/earth plinth, and built of women, demountable walls attached to concrete posts, these houses are raised above normal flood levels. In the worst situation, when river threatens to erode the whole house, the woven walls can be removed to	Under implementation	Concrete posts must be purchased or can be cast locally. The wall panels can be woven locally from jute – this is a local skill using local materials.	The major barrier is cost. Practical Action asks the community to select the poorest people for whom these houses are built (with their help.)	Wealthier people always build their homes on a plinth, and tend to use corrugated iron sheets for walls and roof; this is more durable but much more costly and hotter as well.	http://practicalaction.org/?id=special_appeal_floods

	a new site.					
Technologies	Improved portable cookstove: a low-cost stove that can be made locally, and moved during flood periods, that is more efficient than traditional models of both fixed and portable stoves..	Under implementation	Training of women (2-5 days) and source of suitable clay to mould the stove.		Women who have been trained pass on their knowledge to other women, and in addition can make the stoves for sale, thus earning income. Take-up has been very high.	http://practicalaction.org/practicalanswers/product_info.php?products_id=128{1}1
Sectoral level² NEPAL (local level, agricultural sector) Middle (hilly) region						
Practices	Sloping Agricultural Land Techniques	Under implementation on small scale	Training on the principles of SALT and on the practices involved – establishment of local tree nurseries contour planting, fencing against	Takes 2-3 years before any income/livelihood benefits arise (from fruit/fodder /fuelwood from new trees) and environmental benefits may take at least as long to be apparent. This means that the labour required has to be	This technology was developed in the Philippines, where Practical Action staff learned it.	http://www.fao.org/docrep/u7760e/u7760e09.htm

² The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

			<p>livestock, regular trimming. Needs drought tolerant, low growing leguminous species useful for fodder and fuel wood. Control of grazing and browsing is essential</p>	<p>rewarded from outside funding for schemes to be viable. Needs drought tolerant, low height, leguminous species useful to fodder and fuel wood. Control of grazing and browsing is essential</p>		
Practices	<p>Village insurance scheme for livestock breeding: to extend the benefits of a goat-breeding scheme, through insurance so if an animal given as part of the project dies, a replacement can be bought.</p>	<p>Under implementation</p>	<p>Requires willingness of participants to pay a small fee, and for this to be managed by a community-based organisation.</p>			

Practices	Farmers school	Under implementation	Weekly farm visit by the experts and orientation training on problems and solutions in the field	Training needs to synchronized with farmers' crop calendar	Farmers receiving relevant information learn to solve problems themselves which boosts their confidence; production was increased remarkably	Report can be provided on request
Practices	Introducing perennial fruit crops to reduce vulnerability to erratic rainfall for cereal crops such as rice	Under implementation	Awareness raising on climate changes; training on fruit cultivation; support for marketing the produce. Supply of fruit tree scions.	Reluctance of farmers to take risks through diversifying; poor access to local markets – no vehicular transport for produce. Benefits take a few years to come through	The success of one family in changing crops leads others to try. Multiple benefits – besides fruit, there is timber, fuelwood and environmental benefits	
Local community level³ KENYA (semi-arid and arid areas)						
Technologies	Sand dams for capturing water from seasonal rivers in arid and semiarid areas	Under implementation (completed examples)	This is a new technology for Kenya, and training is needed. Some materials – cement, iron reinforcing rods – need to be bought in	There are costs that have to be borne by outside agencies, as there is no funding in Kenya. Line ministries are still more in favour of higher technology interventions such as bore holes, despite	This technology was used to bring together two pastoralist communities who had been in conflict over water resources and grazing land; implementation was made conditional on the two tribes working together in equal numbers, women and men. It was successful in this, and a	http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=60

³ The sectors below are given as examples. Please provide information on any other sectors which you consider important and have examples to share.

			and transported to the remote areas.	evidence that these lead to localised degradation of land and are high cost for maintenance as well as needing engineering skills not always available in the local population.	joint management committee was set up to agree access for different groups.	
Practices	Seed-saving and exchange for drought-tolerant crops	Ongoing	Training may be needed on seed multiplication – selecting the best seed from a crop for propagation though often such skills are possessed by someone in the village. Capacity may need building for organising seed fairs and exchanges – through a CBO.	Barriers are more at macro level. Most seed available to farmers is of high yielding modern varieties of major crops, which are not well suited to drought-prone conditions. Promotion of so-called minor and traditional crops poses a challenge and potentially a commercial threat to the seed companies – very large and trans-national businesses keen to control the food chain through dominance of the seed and chemical input markets. Likewise, most agricultural extension	From introduction in a project, the seed fair concept has been widely adopted by other communities and NGOs operating in Kenya. Support, in terms of presence and advice, is given by the local agriculture department staff.	http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=61 http://practicalaction.org/?id=web_of_life

				<p>staff have been trained in HYV and high input agriculture, and some staff may be reluctant to promote what their training suggested were 'backward' approaches.</p> <p>Another challenge comes from the need to scale up what are currently a number of local initiatives into a national network for seed supply, based either on exchange or on a market approach. Funding has been sought for such a programme, but applications have so far been unsuccessful.</p>		
Technologies						
Practices	Community based animal health care; many areas of Kenya are	Ongoing.	Involves extensive training for suitable individuals selected by their	Barriers in Kenya existed in the form of legislation prohibiting anyone other than qualified veterinary surgeons from administering		http://practicalaction.org/practicalanswers/product_info.php?products_id=130

	becoming too dry for reliable crop production.		community and then ongoing support for a number of years. Funding for initial equipment and drug supply is also required. Awareness raising among the community of the potential benefits of CBAH must follow understanding community perceptions of animal health problems and current coping strategies.	modern drugs (to protect professional interests); there were also laws prohibiting the use of locally derived plant-based medicines. While these barriers have been overcome in Kenya, and laws have been changed, it took considerable time, and similar barriers might exist in other former colonial nations.		
Local (community) level, Zimbabwe						
Technologies	Underground rainwater harvesting; a combination of contour bunds and	Ongoing	Awareness raising, training and leadership training are all key elements for	This technology developed from an approach used during colonial times, which had not worked well. Initially there was reluctance to use this	The community was able to improve on the technology demonstrated, having identified a particular local issue and suggested a modification to address it. Implementation of	http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=57

	furrows, with storage tanks dug below ground level within the furrows		introduction of this labour intensive technology for capturing scarce rainfall and retaining it in the field where plant roots can access the moisture.	approach again, until it was shown that the technology not only yielded results if properly carried out, but also was under the control of the farmers.	earthworks, in a country devastated by HIV/AIDs required a high level of community labour sharing, as many families lacked the labour to construct bunds and tanks without help.	
Practices	Integrated soil fertility	Ongoing	Training required. Uses locally available materials for composting and mulching. This is a knowledge intensive approach, and does need additional labour.	A combination of good practices based on organic farming and permaculture, to retain moisture in the soil and improve fertility.	Where available water is the limiting factor for crop production, retaining soil moisture can lead to large increases in yield. The practices increase the soil's productivity, so that productivity continues to rise for some years before stabilising.	http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=55
Practices	Introduction of minor crops	Ongoing	Training in crop cultivation and awareness raising on improved methods, and seed-exchange of		Even in drought prone areas, certain crops can do well, including water melons and tomatoes. These crops provide additional nourishment and a small income for the farmers.	DG's brief

			most suitable local varieties.			
<i>Local community level – Sri Lanka</i>						
Technologies	Underground rainwater harvesting: run off is collected from the field and stored in tank below ground; water for irrigating vegetable gardens is then lifted. Additional water-saving practices are combined with the tanks, such as pitcher irrigation – unglazed clay jars, buried near tree roots, are filled with water,	Ongoing	Training on construction of tanks, and funding for the tanks. Though incomes rise as a result of having access to water during dry seasons, this would probably not be enough to service a loan to cover construction costs.			http://practicalaction.org/practicalanswers/product_info.php?cPath=&products_id=58

	which seeps to the roots without loss through evaporation ; and mini-bunds, in crescent shape, constructed around fruit trees to trap and retain rainwater					
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Type of adaptation action⁴

Community based planning to increase resilience to climate change

Title of adaptation action, including projects Status of adaptation action

Under implementation

Needs in order to successfully implement the adaptation action

Community participation from the outset

Staged process incorporating all the following:

- Participatory assessment of climatic and environmental changes in recent years
- Participatory assessment of current coping strategies and their adequacy for current climate variability and projected climate change

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- Awareness raising on the causes and likely impacts of climate change – community level and among district level stakeholders including line department staff and local politicians
- Identification of community capacities and assets
- Identification of options for strengthening local natural resources, livelihoods, and preparation for climate-related disasters
- Training selected households (most vulnerable, most suitable – community selection) in practices, technologies, preparedness etc
- Exchange visits between communities, to extend the impact of the work.
- Establishing network of local organisations concerned with community development and environment, for awareness raising and advocacy
- Establishing links with government to raise awareness of climate change impacts on vulnerable communities and strategies and policies to support adaptation activities

Practical Action is continuing to work to develop a model of what constitutes community based adaptation, and how to measure adaptive capacity.

Concerns/ Barriers

Development of methodology of implementation is ongoing. One issue is the resource-intensive nature of community-based work. It is expected that sustainability of project activities can be achieved, provided that climate change is kept within the limits of 2 degree temperature rise. Questions arising are:

- Who will implement/develop methodologies at this local level? To date, it has been NGOs and IFRC. This limits the scale of activities, and makes it dependent on donor funding
- Governments do not have a good record of intensively working with the most vulnerable communities
- Science is not yet able to provide adequate forecasting at local enough levels, to enable people to know how their climate might change in the future.
- Scaling up will require many barriers to be overcome: interdepartmental rivalries and lack of co-operation; inflexible ways of working; not valuing local knowledge.
- A model of resilient agriculture involves diversity and well-managed natural resources, and low dependence on costly external inputs. This is not generally the kind of agriculture that governments and donors promote – funding and research is mainly directed to cash crops for export, and modern hybrid varieties of staple crops that depend on high level of inputs including water for their productivity. This kind of agriculture is very vulnerable to a changing climate

Experiences/Lesson learned

Local knowledge is key to adaptation, and must be the starting point

Many technologies may seem appropriate, but cultural and social norms play a big role in determining which ones will be successful in any location.

The technologies and practices listed in the table above, taking the work in one country have been used, with local variations, in other countries where Practical Action works. The table therefore does not represent the sum total of our experience relevant to adaptation.

References

Project leaflet: http://practicalaction.org/?id=climatechange_resilience

Presentation from Second Dhaka Workshop on Community based adaptation

<http://www.bcas.net/2nd-cba/Documents/tc-1b/Rachel%20PA.pdf>

http://www.bcas.net/2nd-cba/Documents/tc-2a/Presentation_Dinanath_BCAS.pdf

Minor crops are the key for sustaining livelihoods in drought seasons, lessons from Zimbabwe.

Douglas Gumbo
(Facilitation & Livelihoods Advisor, Practical Action Southern Africa)

Executive summary

Over the years agricultural production policy in Zimbabwe has been focused on promoting production of coarse grain such as hybrid maize in order to promote food security in the country. However, its growth is increasingly coming under stress due to high temperature and low rainfall conditions being experienced. Formal seed multiplication and distribution mechanisms focus on narrow group of crops and varieties that do not suit the current conditions where rainfall is becoming less predictable than the previous decades.

The greatest challenge to government lies in the sensitization of subsistence farmers to the impacts of climate change. The farmers already operate in the most marginal areas and are certainly the most vulnerable group. There is need for a more intensified approach and policies to raising the awareness of these farmers with regard to the need for crop diversification, crop switching, conservation tillage, and water conservation. This policy brief provides evidence for the potential of minor crops in Zimbabwe, recommending a shift from a reactive approach to adaptation to an anticipatory approach.

Context and importance of the problem

Over the years agricultural production policy in Zimbabwe has been focused on promoting hybrid maize. Currently, maize out-yields minor crops such as sorghum and millet in many, if not most, years in wetter regions and it offers higher yields in many areas with acidic soils. This is a result of historical support for improvements in maize productivity. Maize has been favoured by the development and dissemination of improved varieties, by efforts to promote fertilizer use, and by greater extension support designed to improve crop management. However, its growth is increasingly coming under stress due to high temperature, low rainfall conditions and the current conditions where rainfall is becoming less predictable than in previous decades.

Climate change introduces greater variability in yields, thus making hybrid maize production and other coarse grain crops a more risky agricultural activity. In ecological region IV and V (semi-arid), there is a strong likelihood that climate change will make the region a non-coarse grain producing area. If this becomes real, the whole of Natural Region IV, which represents 42 percent of communal areas, will not adequately supply its population with the staple food crop. There is need for a clear agricultural policy that can steer the agricultural sector in a direction more resilient to climate change. Government can actively influence crop switching, water conservation measures, and a host of other management activities. One main crop switching advocated for is the promotion of minor crops.

Minor crops are defined as small-scale farmers' crops that are open-pollinated. These are traditional crops that are tolerant to low and erratic rainfall regimes. Examples of these crops include open pollinated maize varieties, small grains such as sorghum and millet, groundnuts, cowpeas, sweet potatoes, watermelons and pumpkins. Minor crops remain critically important in many of the driest and most food insecure areas of Zimbabwe. For example, sorghum and millet, are suitable for production in drought-prone, semi-arid areas. Other areas contain acidic soils suited to the production of finger millet. Although currently relegated to semi subsistence status, these crops remain essential food staples for many of the poorest farm households whose capacity to purchase maize seed is limited.

With increased unpredictability of rainfall, farmers may begin to switch to different crop types or change to more drought- and disease-tolerant crops. Farmers may introduce irrigation systems in areas where high temperatures and rates of evapotranspiration lead to reduced levels of available moisture. Switching from maize monocultures to more diversified agricultural production systems will help farmers to cope with changing climatic conditions. Monocultures are more vulnerable to climate change, pests, and diseases. The use of minor crops adaptable to drought will give farmers greater flexibility in adapting to climate change. Agricultural biodiversity is a key strategy in building resilience to livelihoods in the face of climate change; policy support is needed to promote a range of open-pollinated crop species.

The picture below illustrates the potential for good yields of minor crops in a drought year.



Mrs. B. Ncube in Ward 17 of Gwanda showing potential of minor crops.



Mrs. Jenifer Sibanda in Ward 17 of Gwanda decided to go for Maize to no avail

Minor crops such as small grains (sorghum and millet), pulses and watermelons have gone a long way in addressing household food security needs in some of Zimbabwe's remote, poor and dry regions such as Masvingo and Matabeleland provinces. The immediate priority for improving the productivity of minor crops and the use of these crops by the government must be to improve the food security of rural households. The competitive position of small (pearl millet in particular) principally derives from their relative drought tolerance. Sorghum and millet are more suited to areas with high temperatures and low or unstable rainfall than maize.

Policy recommendations

In anticipation of funding for programmes on climate change adaptation we recommend:

- Investment into research and development, above all into the agro-processing of minor crops
- Promotion of benefits of the minor crops to consumers through research and development of food products made from minor crops, such as composite flours, traditional and industrial brewing.
- Seed and crop recovery programmes diversified to include distribution of seeds for minor crops.

- Shifting market policies, changing regulations, and reducing subsidies favouring maize to provide incentives to produce and consume these crops.
- Education and Empowerment of small-scale farmers by government so that farmers are encouraged to practice crop switching and diversification

Conclusion

Without the appropriate policies or adaptive strategies in place, the smallholder farmers will find it extremely difficult to operate sustainable agricultural production systems in an environment with changed climatic conditions. The greatest immediate potential for improving the competitive position of minor crops is the development of improved varieties and hybrids. Small farmers in semiarid regions have shown a willingness to try new seeds. Hybrid maize has been adopted by more than 90% of Zimbabwe's small farmers, including many farming in highly drought-prone conditions.

The potential solutions to agricultural sector problems resulting from climate change will require increased financial resources, a greater commitment to research efforts to develop and acquire new technologies, and the development and application of skills in production of minor crops.

Climate change compounds the need to increase the efforts to improve the knowledge and skills of farmers, remove constraints to farmer adaptability and innovation, and expand the options available to farmers. An expansion of the diversity of crops and farm technologies available will improve the chances of adapting successfully to a future in which existing farming systems are threatened by climate change. Thus, anticipatory measures will enhance the adaptability of farmers by speeding up the rate at which farming systems can be adapted to climate change, and will significantly lower the potentially high costs associated with adjustment.