Pakistan Journal of Social Sciences 3 (6): 868-872, 2005

Back to Basics: The Role of Indigenous Knowledge Systems (Iks) in Agro-biodiversity and Household Food Security in the Smallholder Agriculture Sector: The Case of Chipinge (Zimbabwe)

Crescentia Madebwe, Victor Madebwe and Jacquiline Kabeta
Department of Geography and Environmental Studies, University of Midlands State
P. Bag 9055, Gweru, Zimbabwe

Abstract: The paper uses a synthesis of data collected using household questionnaires and Focus Group Discussion (FGD) to examine the role of Indigenous Knowledge Systems (IKS) in agro-biodiversity and household food security in the smallholder agriculture sector. Period analysis showed that between 1994 and 2002, there was a decline in agro-biodiversity of over 50%. An inverse relationship was observed between farm size and agro-biodiversity. Older farmers (50 years and above), grew more crop types and crop varieties compared to younger farmers (30 years and below). Gender differentials in levels of agro-biodiversity conservation at farm level were observed with female-headed households growing more types and varieties of crops compared to male-headed households.

Key words: Role indigeneous knowledge system, smallholder, chipinge

INTRODUCTION

Zimbabwe faces many political and socio-economic developmental challenges. Economic regression post 2002 has seen social and economic indicators going down. The [1] shows that year on year inflation is about 314%. Unemployment is between 70%-80%. About 80% of the population is below the total consumption line (Z$ 750 000). In addition, 34% of the population is infected with HIV/AIDS [1].

Access to adequate food is a basic human right and is catalytic to the realization of all other rights[2]. Yet, according to the United Nations World Food Programme, half the population in Zimbabwe for the third successive year, will need food aid in 2004. Food shortages are a result of a multiplicity of factors that range from severe droughts, flooding, macroeconomic, institutional and sectoral policies that constrain economic growth[3]. A pertinent question to ask is whether or not Zimbabwe has lost the battle for national and household food security. Many households both in the urban and rural areas are vulnerable to food insecurity. Between 2003 and 2004 the United Nations Agriculture Relief Programme assisted 950 000 households[4]. There are reported numbers of people in both urban and rural areas suffering from both hunger and chronic under-nutrition[5]. Diffuse media coverage of deaths due to hunger and malnutrition in both urban and rural areas has generally resulted in under reporting of such events. Reporting such events in the state media is considered a national embarrassment.

Urban poverty due to high levels of unemployment, instability of incomes due to high inflation and a phenomenal rise in the working poor (living on the equivalent of US$1.00 or less a day) has increased the number of food insecure households country wide. By March 2004 the minimum wage for workers in industry (Z$ 93 000) could purchase only an estimated 12% of the Consumer Council of Zimbabwe's estimated 'food basket' comprising basic food items for a family of six [4]. Modern agriculture production strategies that emphasize the use of hybrid varieties, fertilizers and agriculture technology in the smallholder sector have lost their lustre. Lack of individual, national and sectoral capacity to produce and/or import agricultural inputs including seeds, fertilizers and fuel due to foreign currency shortage, high transport costs, removal of subsidies on agriculture inputs, shrinking farm sizes and profit margins have left many smallholder farmers disillusioned [6]. Focus on monoculture, a narrow range of economically valuable crops and farming approaches unsuited to marginal farming areas among resource poor households has not improved the farmers' expectations of a reasonable standard of living.

Attaining national food security is a fundamental developmental goal. Even during years when this was feasible, it has been presupposed that national food security subsumes household nutrition and food security. According to Quisumbing *et al.*, [7] themultidimensionality

Corresponding Author: Crescentia Madebwe, Department of Geography and Environmental Studies, University of Midlands State P. Bag 9055, Gweru, Zimbabwe

of food security is demonstrated by the fact that it encompasses such components as food production, economic access and nutrition security. Out of the 88 low-income food deficit countries in the world (including Zimbabwe), 42 are in sub-Saharan Africa. Since 2002, Zimbabwe has not had the capacity to produce or import adequate food. There is need for concerted efforts to de-emphasize high input, technology oriented agriculture production strategies in the smallholder sector comprising significantly of socio-economically marginalized and food insecure households. Deliberate efforts must be made to initiate, nurture and support low cost agriculture improvement models that seek to reform agriculture in the smallholder sector through harnessing the synergistic relationship that exists between agro-biodiversity, Indigenous Knowledge Systems (IKS) and farming practices. The latter have received minimal attention in formal agriculture training at national, institutional level and in natural resource conservation, rural development policies and programmes [8]. Sporadic efforts have been made to maintain a data base and to restore the dignity of traditional food crops by a few NGOs but like all development assistance projects, impact is limited in terms of spatial extent and replicability of projects. From inception stage to take off such pioneer projects tend to benefit only selected population subgroups in specific localities. The challenge is not to redirect activism away from in-situ biodiversity conservation which predominantly focuses on protected areas but to generate as much activism and enthusiasm for ex-situ biodiversity conservation in productive landscapes such as agriculture [9]. Agro-biodiversity has the advantage of enabling households to attain food self-sufficiency in both production and consumption. Resource poor families, under the circumstances, become less vulnerable to agro-ecological risks. Indigenous Knowledge Systems (IKS) and farming practices form the bedrock of a community's composite and collective wisdom, passed on from generation to generation. IKS act as a community's amour against environmental shocks and are a manifestation of a community's resilience and resourcefulness. IKS allow communities to solve local environmental problems using endogenous solutions over which they have full control.

The deleterious effect of HIV/AIDS on households and communities in Zimbabwe makes it imperative to inject a sense of urgency to efforts that seek to halt both the erosion and loss of IKS and farming practices. Management of opportunistic diseases for people living with HIV/AIDS depends to a large extent on good nutrition. Household food insecurity exacerbates HIV/AIDS morbidity [8]. In addition, the pandemic is a threat to intra and inter generational transfer of IKS.

MATERIALS AND METHODS

The study was conducted in Mahenye Ward in Ndawayo Communal Area in Chipinge District. The area is bounded by the Mozambique border to the east and the Save river to the west. The area lies in Agro-ecological region 5 where rainfall ranges between 450-500mm a year (Department of Water, 2002). Occurrence of mid-season drought makes crop production unpredictable. Holdings range from 0.5 ha to 2.5 ha. The major economic activity is subsistence crop and livestock production.

The purpose of the research was to determine the extent of agro-biodiversity loss in the smallholder sector and its likely impact on household nutrition and food security. To this end period analysis was used to determine decline in crop types and crop varieties that were grown between 1994 and 2002. The need to legitimise and increase the socio-political acceptance of IKS and traditional farming practices in agro-biodiversity conservation is also highlighted.

The paper uses a synthesis of data collected using questionnaires and Focus Group Discussion (FGD). Using households as sampling units, socio-demographic data and information about individual and community knowledge and use of IKS and traditional farming practices in food production was collected using household questionnaires. A total of 146 households out of a potential 300 were canvassed for information. Linearity of village settlement patterns in the area allowed for systematic random selection of households.

Convenience sampling was used to select participants for FGD. In broad categories, the groups were made up of village elders and traditional leaders. The terms are used here collectively to refer to people perceived by the community to be the custodians of IKS, culture and indigenous farming systems. Other participants included Agricultural Extension Officers, village development chairpersons and leaders of men and women' farming groups. FGDs were in the main used to evaluate the Mahenye community's attitudes towards traditional measures of conserving agro-biodiversity, trends in crop biodiversity loss, crop sequences, cropping patterns, community knowledge and gender differentials in knowledge of seed selection and preservation.

RESULTS AND DISCUSSION

Background characteristics of household heads are shown in Table 1.

Table 1: Background characteristics of household heads

Characteristic	Percent(%)
Age (years)	
30 and below	26
31-50	50
above 50	24
Gender	
female	58
male	42
Education	
no education	18
primary	73
post primary	9

Table 2: Main crops grown in Mahenye

Crop type	Percent households growing crop	Mean area cultivated per household per crop (ha)
Sorghum	30	0.4
Maize	100	1.5
Pearl millet	15	0.2
Finger millet	10	0.3
Groundnuts	40	0.3
Cowpeas	20	0.1
Roundnuts	27	0.1

Due to the gendered nature of rural-urban migration, there are more female heads of households (58%) than male heads of households (42%). There are also fewer younger adults (26%) engaged in agriculture. In terms of migration the latter group is the most mobile. The majority of farmers (73%) have primary education.

Main crops grown in the area are shown in Table2. Maize is the dominant crop grown in the area in terms of both the number of households growing it (100%) and mean hectarage assigned to its cultivation (1.5 ha). There is great inter-household variability in terms of the extent to which the other crops are grown. The latter are grown on disproportionately smaller hectarage compared to maize and by fewer households.

Srivastava [10] and Fowler *et al*,.[11], used total number of crops and crop varieties grown as a measure of agro-biodiversity. Table 3 shows the status of agro-biodiversity in the study area for selected years for which data was available. Crops selected represent dominant food crops grown in the smallholder sector irrespective of level of production (commercial/subsistence) and variability in the range of crops grown by farmers on a continuum from monoculture to moderate diversity in both crop types and crop varieties.

Period analysis of genetic material loss per crop shows a steady decline in agrobiodiversity for all crops notably maize, round nuts and finger millet where there is over dependence by households on 1-2 crop varieties. This is not anomalous as it reveals conformity to modernization strategies in the agriculture sector that have inadvertently substituted traditional crop diversity with a limited range of high yielding varieties [12]. The predominant motive of the proponents of the agriculture modernisation paradigm has been to encourage farmers in the smallholder sector to produce a narrow range of market oriented crops for the urban and export market without conscious concern for rural households' nutrition and food security. Illusionary monetary gains from anticipated sale of agriculture produce fuelled by pre-season announcement of pre-planting prices have been used to entice smallholder farmers to unwittingly join the commercial farmers' bandwagon. In the process, focus on market-oriented production of a narrow range of crops has supplanted household nutrition and food security through loss of agro-biodiversity. Consequences of such strategies for affected households are reduced household food consumption, food diversity and limited options to counteract effects of agro-ecological shocks.

Table 3: Crops and crop varieties grown in Mahenye 1994 and 2002

Crop types and crop varieties	Percent of households growing specified varieties1994	Percentofhouseholds growing specified varieties2002
Sorghum varieties		
1-2	75.5	91
3-4	21.3	4
>4	15.2	5
Maize varieties		
1-2	98	100
3-4	2	0
>4	0	0
pearl millet varieties		
1-2	78	88
3-4	22	13
>4	0	0
finger millet varieties		
1-2	87.5	99
3-4	11.6	1
>4	0.9	0
groundnuts varieties		
1-2	87.4	95
3-4	8.6	3
>4	4	2
Cowpeas varieties		
1-2	94.4	100
3-4	3.7	0
>4	1.9	0
round nuts		
1-2	83	100
3-4	10.7	0
>4	0	0

Source: Area Production Crop Records 1994 and 2002

For most resource marginalized rural households, nutrition and food security are inherently dependent on households' ability to produce sufficient food [2]. Household nutrition and food security are inextricably dependent on genetic diversity which as is evident from the Table 3, is severely under threat having been compromised by policies that place blind faith in agricultural scientific technology in spite of the inability of most smallholder farmers to access or purchase supportive inputs due to limited economic means.

Table 4: Household crop production: 1994 and 2002 number of crop varieties grown per household

	1994			2002		
Characteristic	minimum	maximum	mean	minimum	maximum	mean
Number of crops grown per household	2	13	6.4	1	5	3.6
Number of crop varieties grown per household	5	28	9.7	1	11	5.8

Agrobiodiversity Loss: Agro-biodiversity loss in the study area is shown in Table 4.

Data on range of crops and crop varieties was collated from information obtained from household questionnaires and FGD. Table 4 shows that the crop portfolio that addresses a household's food and nutrition security in the smallholder sector has shrunk overtime. Between 1994 and 2002 there was over 50% loss in agro-biodiversity when crop types and crop varieties grown per household are used as a measure of agro-biodiversity [10,11]. This lack of diversity in food resources is a major threat to household nutrition and food security making household members vulnerable to shocks arising from environmental threats. Such a scenario severely undermines the health status of household members, which in some cases has spawned chronic adult and child malnutrition (The Standard (Zimbabwe) 12 September 2004). Severe household food insecurity has resulted in whole communities being dependent on exogenous solutions, particularly donor food aid.

Marginalization of IKS has resulted in rapid loss of traditional seed varieties best suited to the prevailing agro-ecological conditions. Emphasis on high yielding seed varieties and associated inputs has resulted in involuntary rural households' indebtedness to seed producing companies and agriculture input financing institutions. In the last 4 years, persistent seed insecurity or scarcity due to removal of agriculture input subsidies, loss of seed production capacity due to lack of foreign currency and high transport and energy costs has disenchanted smallholder farmers and increased their despondency with modern agriculture improvement strategies. Recourse to traditional seed types is not an easy option as over time most farmers would have abandoned and lost their traditional seeds[13].

Information from household questionnaires and FGD demonstrated that there is an inverse relationship between farm size and agro-biodiversity. Genetic loss was more marked where holdings were small (less than 1 ha) compared with larger farm units. Sanger [14], observed that in Ethiopia farmers grew 60 different sorghum varieties on a 500 ha farm. In addition, older farmers (50 years and above) were more likely to more grow crop varieties than younger farmers (30 years and under). This is due to the fact that older farmers, among other reasons, had larger farms. Due to high person-land ratios and the custom of partible inheritance, younger farmers overally had smaller farms. Older farmers displayed greater knowledge of prevailing local agro-ecological conditions and as custodians of IKS; they have strong cultural values and belief systems.

Because traditionally there were distinct men and women's crops, women headed households tended to grow more crop types and crop varieties compared to male-headed households. Rural women in Nigeria grow 18-57 plant species in home gardens[13] . In male-headed households, males are the sole farm decision makers with labour inputs coming from spouses and children. Gender differentials in the range of crops grown per household were more marked in the older ages but were insignificant among younger farmers (30 years and under). Young farmers, by contrast, were better educated and tended to be disenchanted and sceptical about perceived benefits arising from the use of IKS and traditional farming practices [15]. Among this group of farmers, commitment to the land is not as strong and there is greater abandonment of farming operations for perceived short term lucrative ventures such as gold panning and other off-farm activities. For such families, household food security is precariously dependent on economic access but because of inflation, incomes are greatly unstable. Fewer farmers, (less than 20%) practised intercropping or permaculture which in themselves are a useful measure of biodiversity. The majority of farmers practised mixed farming.

Seed Selection and Preservation: This is not considered a priority after years of dependency on commercially produced high yielding varieties. In over 80% of cases, there was convergence in choice of crop types rather than diversity. Hybrid varieties have supplanted traditional open pollinated crop varieties in spite of the latter's reputed superior nutritional qualities[14]. Use of Open pollinated seed varieties would help reduce seed insecurity and associated input costs among resource strapped farmers (United Nations Relief and Recovery Unit, 2004). The continued assault on IKS has eroded the traditional seed base.

IKS and Food Security: Because of the crucial role IKS plays in rural household nutrition and food security there is need to adopt agriculture policies that help to legitimise IKS, traditional farming and environmental conservation practices. To this end, commitment should be made to encourage the perpetuation of intra and intergenerational

transfer of IKS and farming practices. Focus group discussions showed that village elders have a vibrant knowledge of traditional seed selection and preservation techniques with emphasis being placed on seed size, colour, texture, palatability and resistance to disease and pest attacks. Common seed preservation techniques include smoking and coating selected seeds with wood ash. As experts of their environment, village elders displayed tremendous knowledge of traditional crops and crop varieties best suited to local agro- ecological conditions. Communities should be capacitated to attain household food security through creating an enabling environment that destigmatizes the use of IKS and indigenous farming practices as being retrogressive in order for such communities to use IKS to build sustainable thresholds of household nutrition and food security.

CONCLUSIONS

Biodiversity is critical for the survival of resource marginalized communities as a source for food, shelter and spiritual fulfilment. Modern agriculture improvement strategies, IKS and farming practices are not mutually exclusive. There is need to harness and utilize the synergy that exists between modern agriculture improvement strategies and IKS in order to improve the food supply and resource base of many households. There is also need to implement strategies that will accelerate the socio-political acceptance of IKS and farming practices in order to reverse the severe erosion of agro-biodiversity and traditional genetic crop material. IKS enable farmers to make autonomous cost-benefit decisions that are unlikely to be negatively affected by factors external to the farm. Indigenous crops are less labour intensive and are therefore more sensitive to HIV/AIDS related labour stress [8]. The low input requirements of traditional crop varieties can help to reduce the negative economic cost of HIV/AIDS on agriculture in the smallholder sector.

A new area of concern is the land reform programme, which is currently underway. The programme may unwittingly contribute to continued loss of agro-biodiversity and traditional crop genetic material. The majority of the people are being resettled in new agro-ecological regions different from agro-ecological regions of their origin. The new settlers do not have the technical knowledge of farming constraintsnand potential of the new agro-ecological.

This may perpetuate continued household and national food insecurity thereby undermining one of the fundamental reasons for which the land redistribution programme can rationally be justified and the political sympathy that it is meant to attract.

REFERENCES

1. United Nations Development Programme, (UNDP). 2003. Zimbabwe Human Development Report. Harare: UNDP.
2. FAO., 1998. The Right to Food in Theory and Practice. Rome: FAO.
3. Fauth, K., 2004. Who will help Zimbabwe? http://www.globalhealth.org/reports/ .
4. United Nations Relief and Recovery Unit., 2004. Zimbabwe Humanitarian Situation Report. http:// www.reliefweb.int.
5. The Standard (Zimbabwe) 2004.
6. Global Environment Facility., 2002. The Challenge of Sustainability. Washington: Global Environment Facility.
7. Quisumbing, R. A., *et al.,* 1995. Women: The Key to Food Security http://www.ifpri.org
8. Gari, A.J., 2002. Agrobiodiversity, Food Security and HIV/AIDS mitigation in Sub-Saharan Africa: Strategic Issues for Agricultural Policy and Programme Responses. http://www.fao.org.
9. World Bank., 2002. Sustainable Development and the Global Environment. Washington: World Bank.
10. Srivastava, N., *et al.* 1998. Medicinal Plants: An expanding rate in development: Washington DC: World Bank.
11. Fowler, M., *et al.*, 1990. Shattering: Food Politics and the loss of genetic diversity Arizona: Tucson University Press.
12. International Development Research Centre., 2001 Agricultural Biodiversity. http://web.idrc.ca
13. Huvio, T., 1999. Gender and Local Knowledge. http:// www.rdfs.net
14. Sanger, C., 1998. The Role of Indigenous Seeds in Africa's Food Security. http://web.idrc.ca/en
15. Tshering, C.P and R. Thapa, 2003. Celebrating Mountain Women. Kathmandu: ICIMOD.