LESOTHO HIGHLANDS DEVELOPMENT AUTHORITY

CONTRACT 1204

"Consultancy and Project Management Services to develop socio-economic protocols for areas downstream of Phase 1 dams and conduct the socio-economic and epidemiological impact survey downstream of Phase 1 dams."

# DOWNSTREAM SOCIAL MONITORING STUDY

# IFR REACHES:

# IFR 1, IFR 2, IFR 3, IFR 7 AND IFR 9

# EXECUTIVE SUMMARY

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# INTRODUCTION

The Lesotho Highlands Development Authority (LHDA) is committed by the terms of the LHWP Treaty to monitor both the biophysical and socio-economic impacts of reduced flows on areas and communities downstream of the LHWP dams. Following extensive studies in the downstream areas (Contracts 648 and 678), a Policy for Instream Flow Requirements was developed for downstream areas of Phase 1 of the LHWP, together with detailed Procedures for implementation. The purpose of the IFR Policy is to provide for the management of flow releases towards the maintenance of predetermined conditions for riverine ecosystems downstream of Phase 1 dams of the LHWP. The IFR Policy also provides a framework for the determination of resource losses and other impacts in downstream areas and for compensation of affected communities for these losses and impacts.

# OBJECTIVES OF THE STUDY

Part B of Contract 1204 was to design and conduct a study in the downstream areas of the LHWP to measure the use of riverine resources by households and individuals residing in the river sections below the main reservoirs of the LHWP. In addition, the study was to assess the socio-economic, nutritional and health status of these communities in order to assess the possible impacts of the reduced river flows on them[1].

# METHODOLOGY

Contract 1204 used a two-pronged approach to collect information in the downstream areas. First a series of 'qualitative' participatory rural appraisals was done in three communities downstream of the impoundments. The purpose of this exercise was to:

i) assist with the design of the survey questionnaires i.e. the formulation/type of questions to include in the quantitative survey

ii) explore the utility of a qualitative and participatory methodology to assess resource losses in the downstream areas and specifically the effectiveness and efficiency of participatory and qualitative research techniques as alternative methods for social impact assessment within the LHWP

iii) gain an understanding of the issues faced by affected communities given the reduction in river flows and specifically their own perceptions of the impact thereof on their lives.

The second leg of data collection was a quantitative questionnaire survey conducted in the proximal IFR reaches. The survey was done among a randomly selected sample of households. The survey collected information on the use of riverine resources by households and individuals living within a five-kilometre zone of the rivers downstream of the main LHWP reservoirs. Information was also collected on household characteristics, income sources, and selected nutritional and health issues.

[1] This summary is based on the following reports:

*Volume I. Downstream social monitoring study. Report on river usage and socio-economic and related findings in IFR reaches: IFR 1, IFR 2, IFR 3, IFR 7 and IFR 9.* LHDA Contract 1204, 2007.

*Volume II. Downstream social monitoring study. River resource usage and socio-economic characteristics in IFR reaches: IFR 1, IFR 2, IFR 3, IFR 7 and IFR 9.* LHDA Contract 1204, 2007.

*Volume III and IV. Downstream social monitoring study. Food Security, Nutrition, Public Health and Services. IFR 1, IFR 2, IFR 3, IFR 7 and IFR 9.* LHDA Contract 1204, 2007.

*Downstream social monitoring study. Methodology of the monitoring survey in proximal IFR reaches, 2006/2007.* LHDA Contract 1204, 2007.

The sample was drawn from five discreet areas, namely IFR 1, IFR 2, IFR 3, IFR 7 – the proximal IFR's and IFR 9, a reference IFR site. Each of the IFR river sections was further subdivided into two distance zones. Data collection began in October 2006 and was completed in January 2007.

Fieldwork was complicated by the relative inaccessibility of some villages in the various IFR reaches; heavy rains during October 2006 that further constrained movement of the fieldwork teams; the fact that a few of the interviewers were caught cheating during the survey - with the result that their work had to be redone and limited time to conduct the survey.

# MAIN FINDINGS

## Use of river resources

Because compensation to downstream communities is based upon losses of river resources as a result of changes in river flows, the use of river resources by riverine communities is a key factor in IFR monitoring.

Recent biophysical monitoring undertaken by Contract 1237 suggest that the ecological impacts of reduced flows as a result of the LHWP have been moderate, and tended to contradict the claims of communities of drastic reductions in river resources that emanated from the PRA exercises conducted by Contract 1204 at IFR 1, 2 and 7.

Findings from the quantitative survey in 2006 show that usage of river resources differs substantially in terms of the percentages of households utilizing each resource, with mean usage ranging from 24.5% of households for wild vegetables to 3.1% for fish. The most important resources in terms of the numbers of households utilizing them are wild vegetables, trees (18.4%), thatch grasses (17%), driftwood/debris (15.3%) and shrubs (12.7%).

A comparison of the 2006 survey data with the 1999 data collected by the sociological study of Contract 648 show consistent reductions in the percentages of households utilizing river resources between 1999 and 2006. These reductions are of a large magnitude, in fact far larger than one would expect given the biophysical findings on the condition of LHWP-affected rivers.

In conjunction with decreases in the percentages of households harvesting river resources, there was a subsidiary trend that indicated that while the numbers of households collecting these resources had declined, the mean quantities collected had increased. A similar trend was observed in relation to people living in the distal zones of the river corridors (2 – 5 km from the river). While generally lower percentages of households in the distal zone collected river resources, the mean quantities collected were sometimes larger than those of the proximal zone (0 – 2 km from the river).

The relatively large reductions in the percentages of households harvesting river resources in 2006 could suggest that downstream communities have suffered larger losses in terms of usage than the more moderate losses in availability indicated by the biophysical data. There are several possible ways in which one can account for the discrepancy between availability and usage.

- Firstly, the biophysical data could be wrong or, more specifically, could have underestimated the depletion of river resources.
- Secondly, small changes in the availability of river resources could conceivably result in far larger changes in usage, because the scarcer a resource becomes, the more effort is required to harvest it.
- A third possibility is that while in reality the availability of river resources may have decreased only marginally, perceptions of large decreases in availability might have influenced many households to abandon the collection of river resources.

- A fourth explanation seeks the reduction in use of river resources as the product of social forces that are independent of the impacts of the LHWP on the availability or abundance of river resources. The results obtained for the reference river section (IFR 9) provide support for this explanation. If the large decreases in river resource harvesting at the downstream sites could be attributed to the impact of the LHWP, then one would expect a very different situation to exist in the IFR 9 reference river section, which is upstream of a LHWP impoundment and has therefore not been subjected to a modification in river flow as a result of the LHWP. With the possible exception of sand mining, IFR 9 presents a profile of river resource usage that is not markedly different from the profiles of the downstream sites - despite the easier access to the river in this section. This suggests that the reasons for the possible decreases in usage at all sites/reaches, including the reference river section, are likely to be attributed to causes other than the LHWP.

When all these findings are taken into account, analysis suggests that the availability of resources is not the only factor determining whether households harvest river resources. This conclusion is supported by the fact that even in 1999 the percentages of households harvesting specific resources rarely exceeded 50% and for some resources was as low as 5%.

Availability cannot explain why such large proportions of households chose not to harvest river resources when these resources were available to other households. Clearly the determinants of harvesting river resources are more complex, and in addition to the supply of resources, demand factors also need to be taken into account. One such factor is whether households have the necessary resources in terms of time and labour to be able to harvest river resources; whether households are in a position to *afford the opportunity costs* associated with harvesting river resources.

All indications are that changes in river resource harvesting as a result of modified river flows are unlikely to make a significant (or even detectible) difference in the livelihoods and total income of downstream communities. This is not only because the changes in usage patterns as a result of modified river flows are likely to be small, but also because the contribution of river resources to total income is limited, particularly as only a minority of households harvest the majority of river resources. Reaching meaningful conclusions based on the current survey, the 1999 data as well as the biophysical results are constrained by many uncertainties, e.g. the lack of baseline data for IFR 9 - the reference reach, limited knowledge of the relationship between river resource availability and usage, and the possible, but as yet unproven, lack of reliability of the 1999 usage data or for that matter the 2006 data.

On the balance of the available information there is no clear evidence that resource usage has fallen as a result of the impact of modified flows within the LHWP, particularly as this is not supported by the biophysical data. In conjunction with the biophysical data therefore the socio-economic findings provide further confirmation that the LHWP is at the least, meeting its treaty obligations in terms of providing compensation for resource losses resulting from modified river flows.

## Income levels

- The income profiles of the downstream areas were similar to income profiles in the upstream areas, with the exception of LHDA compensation payments at household level made to 'affected' households in the upstream areas.
- Reported household income figures in downstream areas did not show any evidence of a 'trickle down' effect of income derived as a result of communal compensation payments – where such payments have been made.
- Average total income (including own consumption) per household in the downstream areas was M512 per month.

- As a consequence of the poor employment opportunities within the survey area only 12% of households reported earning money from formal employment and casual work (wages).
- On average, a household in the downstream areas had 12.1 animals. Products from animals, particularly wool, mohair, milk and hides were an important income source for households.
- On average the largest contributing source to household income in the downstream areas were proceeds from the sale of animal products ('husbandry') namely 27.8%. The second most important income source was the sale and consumption of crops (22.9%). Remittances accounted on average for 21.1% of income, while wages accounted for 15.4 %. The importance of agricultural produce on household income in the study area is related to the sharp reductions in income accruing from remittances.
- The reported income sources would indicate that on average, resources obtained from the river contribute only a small fraction to household income in downstream areas. Obviously certain individual households may depend more on riverine resources than the majority of households. However, the income and livelihood data collected do not clearly show this.
- Besides the difficulty of relating the use of riverine resources to the reported basket of income of households, it is not possible to indicate whether a reduction in river flows and any resultant loss of riverine resources – if any – had an impact on average household income as no baseline income data is available for comparative purposes.

Income levels – and particularly the poverty in the downstream communities is more a reflection of the location of these areas on the periphery of the Lesotho economy, the topography (making access difficult), the lack of formal employment opportunities, the impact of the decline in remittances from South African mines, the relative low educational qualification levels of the inhabitants and the low prices paid for agricultural produce than anything else.

## Nutrition and food security

- There is no evidence that the current level of nutritional indicators is directly related to a reduction in river flows within the study area.

- The diet of the population living in the downstream areas was predominantly maize based, with little animal foods, fruit and vegetables. Low consumption of animal foods was reflected in the low intakes for various micronutrients (e.g. vitamin $B_{12}$ and niacin). The low intake of fruit and vegetables was reflected in the low intake of especially vitamin C. The variety of foods consumed was low. The average dietary diversity score (DDS) suggested that the nutritional adequacy of the diet was low and that children in the household were at risk for malnutrition. Although this diet has cultural dimensions, the lack of diversity indicates constraints in terms of both affordability and access to a greater variety of foods. This is related to the high levels of poverty found among the study population and the relative inaccessibility of these particular regions.

- Only about 15 % of households in the downstream areas can be regarded as food secure.

- Compared to the upstream areas of the LHWP, downstream areas have a lower household dietary diversity score (HDDS) denoting lower access to a variety of food; a lower dietary diversity score – denoting lower nutritional quality of the diet and a hunger score that denotes that households are less food secure and that more hunger occurs.

- In terms of nutrition status outcome indicators, the anthropometric measurements of females were similar to patterns in respect of nutritional status indicators when compared to the 2004 Lesotho DHS for the Mountain regions and compared to the findings of the series of "upstream

surveys" conducted by Contract 1204. More than four in ten older women were either overweight or obese.

- However, the study found higher levels of stunting, under-weight and wasting among children younger than 5 years in the downstream areas[2] compared to for instance the population living in the upstream areas of the LHWP or in the Mountains region of Lesotho (DHS).

- The complexities of river resource usage can be seen using nutritional status data. Because river resources such as wild vegetables and fish are used to supplement the diets of downstream communities, one would expect a positive relationship between the use of these resources and nutritional status. This is not the case. For example, of the five IFR sites, IFR 7 had the lowest hunger score and was rated as the most food secure of the five sites. However, of all the sites, IFR 7 had the lowest percentage of households harvesting wild vegetables (12.4%), in contrast to 36.5% at IFR 1, 35.3% at IFR 2, 34.7% of IFR 9 and 22.9% at IFR 3.[3] IFR 1, which had the highest percentage of households harvesting wild vegetables, had the lowest mean dietary diversity score as well as the lowest household dietary diversity score.

- Harvesting rates for all river resources were higher in the zone closest to the river (0-2km) than in the more distant zone (2-5kms). For wild vegetables, for example, 35.2% of households in the proximal zone harvested this resource in comparison with only 12.2% in the distal zone. Yet on almost all the nutritional indicators, proximal zone households performed worse than distal zone households. Households closer to the river were slightly less food secure than households further from the river. Households living closer to the river had lower DDS and HDDS scores, as well as lower mean body mass index (BMI) scores for men and older women. On the other hand, households further from the river reported slightly more food shortages than households closer to the river.

Irrespective of the negligible impact that the reduction in river flows had on the nutrition of the downstream communities – if any – it is important that interventions are put in place to address food insecurity and the high levels of childhood malnutrition (although these figures should be verified) and that the nutritional status of the population be monitored at regular intervals. Initiatives to popularise and assist households with food gardens to diversify their diet and to strengthen food security arguably fall within the mandate of LHDA to assist communities affected by the LHWP. One way to accomplish this is to use the LLE's as a vehicle to implement home food garden projects.

A LHDA initiative already underway in the upstream areas is the propagation and distribution of medicinal and other useful plants. This is being done by the Katse botanical garden. By actively extending this service to the downstream communities, LHDA will contribute to offset the potential decline in such plants as a result of the reduction in river flows. At another level this may broaden the variety of the vegetable diet and assist in the preparation of home remedies for common ailments.

## Public health

- An indicator of special interest to this study was the diarrhoea rate among young children. A prediction of Contract 648 was that water borne diseases would increase with a reduction in river flows. This includes gastroenteritis and on a more general level diarrhoea. Reported diarrhoea rates in the downstream area were lower than in both upstream LHWP areas and rates found in the mountain regions of Lesotho (according to the 2004 DHS). Seasonality may have had an influence

[2] The higher than expected levels of childhood malnutrition found in the downstream survey may be partly the result of measurement errors.

[3] It should be noted, however, that the mean quantity of wild vegetables harvested at IFR 7 was substantially greater at 16.2 plastic bags against a group mean of 7.8 plastic bags.

on the outcome (the present study was done in Spring). However, if a change in the water flow regimes played a major role in water-borne infections, such as diarrhoea, one would have expected rates in the downstream areas at levels higher than was found in the 'upstream' areas during the 2006 surveys.

- Given the remoteness of the downstream areas, respondents were relatively well served by health facilities. This is shown by the high levels of usage of these facilities for antenatal care. About 95% of women received antenatal care before their last child was born.

- Respondents mostly listed financial and to a lesser extent distance as the main constraints in accessing medical facilities for advice and care.

- As a measure of mortality, the crude death rate was calculated. Using the *de facto* population as divider, the crude death rate was 19.2, similar to the rate found in the Phase 1A area and lower than the reported rate in the Mohale project area.

- The infant death rate is viewed as a sensitive indicator of socio-economic levels and trends. The reported crude infant mortality rate, 79/1000 births in the downstream areas was lower than the reported rate in the Phase 1A area (93), but higher than the reported rate for Phase 1B (62).

- Fertility remains high in the downstream areas. This has a number of consequences, such as high dependency ratio's, and related pressures on households to care for large numbers of children. The total fertility rate of women in the downstream areas was 5.5 (a value that indicates the average number of children a woman will have in her life time if current fertility trends continue). This lies between the values found in Phase 1A (5.8) and Phase 1B (5.1).

- Given the rapid increase in HIV rates in the Mountain areas of Lesotho, HIV/AIDS will have a far greater impact on the health and social fabric of the population at risk in the study area, compared to reductions in river flows. Therefore it is important to take note of the current knowledge, attitudes and behaviour patterns of the study population regarding sexual and related matters. Knowledge levels about condoms as a method of preventing infection has reached high levels in the downstream areas, indicating an IEC campaign (information, education and communication) that is getting a message across to the population. However, more work has to be done to convince people that having multiple partners are high risk behaviour in terms of STI's and in particular HIV and that actually using a condom is more important than knowing that you should use it.

In conclusion, the overall health of the population at risk is impacted upon by a number of factors, including nutrition, household environmental hygiene (water and sanitation being important components), education levels, knowledge of healthy lifestyles, use of alcohol and tobacco, poverty levels, the availability of health facilities, HIV/AIDS and TB to name some of the more important factors. The reduction in water flows at most plays a role of 'background noise' in possibly intensifying some of the environmental infections. However, campaigns to improve hygiene at household level, coupled to the provision of clean water and sanitation facilities, should more than balance out any possible health impacts of reduced river flows on the population at risk. In this respect consideration can be given to extend the work of the WATSAN teams to the downstream areas. By doing this, a positive contribution will be made to the lives of the downstream stakeholders of LHDA. In addition, LHDA will be seen as making further efforts to develop the Highlands of Lesotho.

## Services and amenities

- A negligible percentage (1.2%) of respondents used the main rivers as their main source of water. Almost half of the households in the downstream areas source their water from an open well or

unprotected spring. Community water systems are used by a quarter of households. This fact is crucial in understanding the possible impact of water-borne diseases on the population at risk (see above).

- Eighty percent of households in the study area did not have a toilet. This impacts on household environmental hygiene with disease related risks (independent of the flow of the main river).

- Approximately 2% of households reported having a full time business enterprise. Given the low levels of disposable income in the downstream areas, the potential impacts of the expansion of local businesses are limited.

## Demographic indicators

- The estimated size of the population at risk in the four proximal IFR reaches is about 40 000.
- The age structure of the resident population is youthful and female, with nearly 47 % of the population younger than 15 years, and a gender ratio of 86 males for every 100 females.
- The downstream areas are characterised by very high unemployment levels. About three quarters of males aged 25-64 reported being unemployed.
- Nearly 40 % of households in the sample had one or more members that were absent from the household.
- As elsewhere in the Highlands, men in the study area had lower educational qualifications than women. Nearly 45 % of men had never attended school, while the corresponding figure for women was only 11%.

Demographic characteristics are the product of a number of social and economic processes and do not reflect any impacts as a result of reduced river flows. However, in the context of assessing any possible socio-economic and health impacts due to altered river flows, the size of the so-called population at risk becomes important.

# METHODOLOGICAL ISSUES

## Participatory approach

Contract 648 included an initial protocol for IFR monitoring. It recommended that qualitative and participatory methodologies be used in socio-economic monitoring of downstream areas of the LHWP. The findings of this study (Contract 1204) indicated that a qualitative / participatory approach to monitoring has many weaknesses and would not be appropriate within the context of the LHWP, e.g. to collect information on river resource usage. Reasons include the following:

- There is a radical disjuncture between the primary aims and priorities of the LHWP and the aims and priorities of the beneficiary communities of its compensation and development programmes. This is because the extent of LHWP impacts on the livelihoods of Lesotho communities and the amounts that should be paid to communities in compensation for these impacts are issues of contestation between the LHDA and the beneficiary communities. Under these circumstances, it does not make sense to use a participatory methodology that actively involves one of the interested parties in a process that will have a critical bearing on the resolution of the contested issues. Clearly a more objective, neutral and distant approach is required.
- There is little or no control in PRA exercises of whom turns up for *pitsos* or group interviews. This means in effect that respondents select themselves, and as such are likely to be unrepresentative of the larger population.
- Within a group situation, as opposed to an individual interview, group dynamics come into play that can, and do, influence the responses of the individual members of the group. Although

provision is usually made within participatory techniques to control group dynamics and to ensure that all members of the group have an equal say, inequalities of status and power among group members, relationships of dependency, community solidarity, and a host of other, often hidden, dynamics can subvert even the best intentions of a group moderator. All of this plays itself out in a process that is flawed by the attempt to reduce a multiplicity of individual situations and perceptions to an artificially created consensual unity, within a context of vested interests and desperate need.

- Given the above and the conflicting results of the participatory exercise compared to the biophysical monitoring carried out by Contract 1237, as well as the findings of the household survey, brings into question the accuracy and reliability of community responses during the PRA exercises.

Thus, in the LHWP areas where compensation is at stake, one can expect that a participatory approach will be fraught with contradictions and exaggerations. This was also seen in the focus group discussions held with 'upstream' communities by Contract 1204. Community members tend to have their own interests at heart, for instance an increase in compensation, making it difficult to disentangle the 'truth' from exaggeration. However, there will always be a role in research in the LHWP areas for participatory / qualitative methodologies, e.g. in discovering emerging issues, designing questionnaires or even taking the 'temperature' of a community in terms of its perceptions and attitudes.

## Availability and usage of resources

The distinction between availability and usage of river resources is crucial in understanding the monitoring of social impacts of the LHWP in downstream areas. 'Availability' refers to the presence or occurrence of river resources and of changes (increases or decreases) in the occurrence of these resources. It is therefore an *ecological* or *biophysical* issue.

'Usage', on the other hand, is a *behavioural* issue in that it involves the use (such as the harvesting, consumption, sale, bartering, etc.) of river resources by people. As such, usage is a legitimate subject for the social or behavioural sciences, unlike availability which is a subject for the natural sciences.

While availability and usage are clearly related to one another, in that usage is often determined by availability, the relationship between the two concepts is not always clear-cut. This is acknowledged in the LHDA 648 and 678 studies in terms of the application of a threshold between availability and usage in which it is reasoned that if availability of a resource drops to a certain level (e.g. 50%), usage might cease altogether.

It is not possible to measure availability with social science methods like surveys. The best that one is able to do with social scientific methods is to measure *knowledge or perceptions of* availability, but such knowledge is often unreliable as was shown by the participatory studies done by Contact 1204 (see above).

Within the context of the LHWP and IFR policy it is important to deal with availability and usage in an integrated manner. In the first IFR studies, availability and usage, i.e. the biophysical and social data, were used in unison to predict the impacts of modified river flows and to calculate compensation. The need to integrate the biophysical and social components of monitoring in downstream areas is an inherent feature of the LHDA IFR Policy and Procedures. Paragraph 3.4.3 of the IFR Policy Procedures explicitly states that the "monitoring of socio-economic welfare and public health must be linked to the biophysical/IFR monitoring". Similarly, in relation to biophysical monitoring of riparian vegetation (which accounts for the bulk of river resources utilized by downstream communities), the policy procedures are also explicit about the importance of coordinating biophysical and social monitoring:

There should be liaison between the social component of monitoring and the biophysical monitoring programme (LHDA, Policy for Instream Flow Requirements, 2003: A1.5).

## Lack of baseline data

Contract 1204 was faced by the lack of baseline data of community usage of riverine resources for IFR 9, the reference river section. However, data collected during the 2006 survey can serve as a baseline for future studies.

It should be noted that Contract 648 did not collect baseline nutrition or food security data. Therefore it is not possible in this study to come to any conclusions as to the impact of reduced flows of the rivers on nutritional indicators – if any.

The approach used by Contract 648 to assess the level of public health in the study area was to list the most common ailments presented at clinics in the study area. The underlying logic was to flag those ailments that can be linked to water such as gastroenteritis and eye complaints. These diseases in theory would be impacted by a reduction in the river flows. However, a major explanatory problem in this regard was the fact that only a very small percentage of households (one percent) depend on the main rivers as their water source. A weakness of this approach was that it did not allow for generalisation, and particularly to calculate prevalence levels among the population at risk.

The first round of IFR studies did not collect quantifiable income data. Therefore it is not possible to assess whether any changes occurred in income between 1998/99 and 2006, and much less so regarding the possible impact of a reduction in riverine resources on actual household income.

The lack of baseline data is complicated by the fact that Contract 648 was done after the flow of the Malibamatso River had already been altered by the construction of the Katse Dam.

## Future monitoring of downstream areas

LHDA Contracts 648 and 678 both emphasised that IFR monitoring was in its 'infancy', and that the development of effective monitoring tools in downstream areas will depend upon long-term adjustment and refinement of these tools. It was noted that a vital element of this process of refinement depended on the extent to which a 'good fit' can be found between the biophysical and social elements of IFR monitoring. For example, the detailed predictions of social impacts on downstream communities presented within the LHDA 678-F-002 report were a product of both biophysical and socio-economic data involving the following variables:

- Biophysical change rates
- The critical nature of usage
- The number of households harvesting resources
- Frequency of usage, and
- Availability of alternative resources (LHDA 678-F-002: S7).

Coordination of the biophysical and social components was the underlying logic upon which the studies of LHDA Contracts 648 and 678 were based, and if any continuity with these baseline studies is to be maintained, then this issue will have to be addressed in future monitoring of the LHWP downstream areas. This is particularly the case in relation to determining the reliability of social responses in a situation in which communities have a vested interest in exaggerating the impacts of the LHWP on their standards of living.

In this regard, it should be noted that biophysical and socio-economic monitoring exercises carried out by LHDA Contracts 1237 and 1204 respectively, were conducted independently of one another. No provision was made for the 'interaction between specialists', although the socio-economic monitoring team was provided with access to the report of LHDA Contract 1237. Because current biophysical monitoring is principally geared to determining whether the desired river conditions set out in IFR Policy are being achieved (LHDA 1237-04-05:xv), the biophysical findings are presented in the broad terms of river condition states, as defined in IFR Policy. This does not allow for comparisons between the more specific data of the socio-economic study on *specific* river resources and the more general biophysical data. For example, it is not possible to determine from the current available biophysical data whether reeds and *leloli* have increased (as predicted by LHDA 678), stayed the same, or have been drastically reduced/no longer exist (as claimed by some of the riverine communities).

Where attempts were made in the biophysical report to provide more specific data of trends in the key river resources between 1999 and 2006 in order to support decision-making on compensation, the validity of the trends provided is heavily qualified in that "in every case caution is urged as the data needed to be 'stretched' in order to provide such indicators" (LHDA 1237-04/05: 133). As a result, only the broadest indications of the current state of river resources in the different river reaches could be obtained from the results of biophysical monitoring. This may well point to the need to extend the coverage and depth of biophysical monitoring in the downstream areas.

Finally it will be wise not to lose sight of the progress achieved by the studies of Contracts 648 and 678 in IFR monitoring in Southern Africa, and to build on the experience of these studies. Because of the complexity and extensiveness of LHDA Contracts 648 and 678, the temptation may be to move away from the methods used in these studies and adopt more conventional or familiar methods of monitoring and evaluation. This will not only entail a loss of valuable knowledge, but also a loss of the considerable investment that went into those two studies.