

HARTIES METSI A ME PROGRAMME

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The Department of Water Affairs (DWA) has appointed Rand Water as implementing agent (IA) for the development and implementation of the remediation project of the Hartbeespoort Dam (HBPD) on 4 June 2006. With Rand Water being the main Regional Water Services Provider in the Catchment of the HBPD has played a determining role to reach this agreement. A core group of service providers and specialists have been identified and agreed with the DWA to assist Rand Water to prepare a management structure, Project Execution Plans (PEP's) and reporting mechanisms for facilitating the execution of the Hartbeespoort Dam Integrated Biological Remediation Programme, also referred to as the Harties Metsi a Me Programme.

The remediation programme consists of interdependent modules intended to ensure that the DWA meets the objective of changing the trophic state of the Hartbeespoort Dam towards the desired state. The programme consists of activities in the HBPD basin and the HBPD catchment area. Critical deliverables require development and implementation of activities in parallel and may need to be aligned with certain legal/policy processes which will add additional timing and budget challenges to the programme. The directive from the Director General of DWA in 2006 to fast track activities in the programme have had a determining effect on the programme scope which impacted on the extent, scheduling and budget. Due to the complexity and overlapping (integration) of the projects the reporting and tracking of same is crucial for identifying areas of concern and to keep the correct focus and the vast number of stakeholders informed and aligned.

The Harties Metsi a Me programme has now entered the final operational phase of the programme. After it's inception by the then North West Department of Agriculture, Conservation and Environment (NWDACE) and the then Department of Water Affairs and Forestry (DWAF) in July 2006, enormous progress have been made to establish the programme and already reaping the results of the biological remediation programme. The oral presentation will highlight the present status of the programme, the progress made and the challenges experienced in the overall programme as well as the separate components that make up the programme

PROGRAMME BACKGROUND

The severe algal growth (hypertrophic state) in the Hartbeespoort Dam has detrimental implications for both human and the broader environmental health. The end result is a decline in the local tourism industry, economical growth and development in the North West Province. The then NWDACE has set, in a greater context, themselves at task to, in collaboration with

the then DWAF and other departments undertake a specialist study to assess and address problems with water quality in the dam. This specialist study resulted in the NW Environmental Series 5 "Hartbeespoort Dam Remediation Plan" that was published in 2005. The then DWAF has appointed Rand Water in July 2006 as implementing agent (IA) for the development and implementation of the remediation plan of the Hartbeespoort (HBP) Dam.

Cause and Effect

Water are transferred from the Tugela and Lesotho Highlands to the Vaal Dam and provided, amongst others to the broader Gauteng. Although the smallest of nine provinces, covering only 1.4% of the land area of the country, Gauteng contributes 33% to the national economy and a remarkable 10% to the GDP of the entire African continent. The province is essentially one big city, with 97% of its population living in urban centres. Being the most densely populated province, Gauteng, hosts some 9.6-million people (20.2% of the total population). That is a lot of bath tubs, showers, buckets of water, households, washing machines, flush toilets, small business, medium business, large business, industry – basically people using water and releasing close to 700 Mega litres of treated effluent, used and polluted water into the catchment of and into the Hartbeespoort Dam per day.

Since the implementation of the special phosphate standard in 1985, no additional actions has been taken. This has been going on for more than 20 years with no action to curb the impacts on the Hartbeespoort Dam and its feeding rivers. The rivers, mainly the Jukskei and Crocodile Rivers, feeding the Hartbeespoort Dam, are in a severe state of pollution.

Even if you could stop the discharges from the waste water treatment works (7 Treatment Works feeding treated water into the Hartbeespoort Dam), it will not have a immediate influence on the eutrophic state of the Hartbeespoort dam in the short term. 66% of all pollution elements, mostly phosphates, are trapped in the dam; the result:

The hard reality is that Gauteng, especially the effected catchment area is developing at a staggering rate. This is a national crisis - seven other dams in the Crocodile Marico WMA alone are already in a hypertrophic state. The remedial action addressed in this business plan will become the blueprint to address this crisis not only in these dams, but across South Africa and its borders.

The Solution

Three geographical zones are addressed in the solution to this problem, Firstly symptomatic treatment, restorative action and creation of biological self cleaning balanced ecosystem are established in the dam basin. Establishing a natural balance in the dam by removing the bulk of the imbalances that exponentially explodes the problem (Algae, hyacinths, unwanted fish, dead shorelines, monitoring, litter traps and trapped sediments with regulating recreational activities) the dam will have a self sustainable cleaning mechanism. This includes the development of a Resource Management Plan (RMP) for the dam to guide and align the different activities with the increasing demand for recreational activities on the dam. The specific needs of dedicated surface areas on the dam, as well as the land required for the remediation activities and access required to the dam. This integrated biological remediation model as developed and implemented at the Hartbeespoort dam, is intended to become the

blueprint for similar hypertrophic impoundments. These regulatory actions will benefit not only the greater Crocodile (West Marico) catchment, but also the country as a whole.

Secondly reducing the impacts from the catchment from point source discharges as well as the restoring and protecting the natural filters (wetlands and riverbanks) in the immediate catchment of the Hartbeespoort Dam. Most of these vital natural filters for incoming polluted water are on privately owned properties. Encouragement of the sensitive areas is addressed through enforcement and awareness programmes launched by the programme. The local community of the Hartbeespoort Dam are at the receiving end of the waste water from the greater Gauteng. The strategy is to spread awareness from the epicentre to the greater catchment regarding the responsibilities of mining, industry, agriculture, individuals and children on better water use. The immediate catchment of the Hartbeespoort Dam is the first line of defence for the polluted incoming water into the dam basin. These action needs to be supplemented by pre impoundments and litter traps.

Thirdly is the regulation of water use in greater Hartbeespoort Dam catchment. The development and promotion of better regulatory measures, effective licensing of lawful water use, the enforcement on unlawful water use and the integration of interdepartmental efforts across the catchment to address the impacts on the Hartbeespoort Dam This includes the alignment and updating of bylaws of the Local Authorities and the development of catchment specific Operational Best Practices to adhere to.

To manage the roll out and operational phase of this solution a tight management and reporting structure, driven by the implementing agent – Rand water, has been put in place to ensure the proper execution of this business plan, supported by a dedicated project management team to guide the programme to achieved deliverables.

PROGRAMME OBJECTIVES

Remediation of the dam will be through integration of biological processes and Integrated Water Resource Management (IWRM) principles to implement programmes. This imply “Food Web Restructuring” activities, supported by physical (engineering) and chemical interventions where necessary. The objectives of this integrated programme are to develop and implement the following activities:

1. Removal and management of biomass accumulated in the dam including algae, hyacinths and other alien vegetation and improve the biodiversity in the dam basin through restoration of shore line vegetation and establish floating wetlands and land restoration along the shore. This protection and remediation of aquatic ecosystem in the catchment will be extended by influencing the protection, restoration and establishment of wetlands and riparian vegetation,
2. Food web restructuring and management through restructuring of the dam basin fish population,
3. Develop an integrated monitoring system to improve the understanding of variables related to the problem such as the waste load entering and being recycled in the dam and to quantify physical and biological upstream impacts, and align monitoring programmes to give effect to and optimise monitoring costs as well as to evaluate effects of actions with respect to the implementation of remediation initiatives,

4. Develop an RMP to manage and take control of activities to ensure sustainability on and around the dam, and on activities to be taken in the catchment that impact on the quality of water in the dam,
5. Implement awareness and education programmes to balance cost and benefit for stakeholders in the catchment area upstream and downstream of the dam regarding their contribution to the remediation initiatives to reduce impacts and optimise the benefits,
6. Investigate and implement measures to control recreational activities on the dam, in accordance with related governing bodies,
7. Investigate to manage quality and quantity of sediments in the catchment through management of urban and farming activities and removal of existing nutrient enriched sediments from the dam basin,
8. Implement projects to reduce inflow of nutrients (phosphates) into the dam through improved effluent treatment, appropriate sanitation options, phosphate reduction initiatives at source and water re-use to achieve temperature destratification from return flows, in-stream water treatment and to investigate inflow diversion, and
9. Enhance compliance and enforcement of the National Water Act of 1996 (Act 36 of 1996) through generic integrated water resource management planning guidelines and office standardisation.

GUIDING PRINCIPLES

1. Improved Water Use Efficiency (WUE) – including optimizing water use, maximizing water re-use, minimize waste and extend the use of water to ensure concurrent multiple water usage,
2. Optimize waste minimization and re-use – ensure reduction of waste generation at source, separation and re-use of waste and re-use water at source through water recycling techniques,
3. Resource Protection and Resource optimization,
4. Comprehensive stakeholder communication, awareness and education,
5. Knowledge transfer and empowerment of designated groups,
6. Job creation during remediation activities and thereafter, and
7. Updates of Execution Plans – frequent update of the Execution Plans to ensure optimum alignment and implementation of BEO (Best Environmental Option) which is outcomes from catchment initiatives and actions planned and implemented.

PROJECT MANAGEMENT

The remediation project consists of interdependent modules intended to ensure that the DWAF meets the objective of changing the trophic state of the Hartbeespoort Dam towards the desired state. Critical deliverables require parallel implementation of activities and may need to be aligned with certain legal processes which will add additional timing and budget challenges to the project. Rand Water, the Project Manager is responsible to the DWAF, the Project Sponsor, for the delivery of the agreed project outputs and integration of these projects.

During this operational phase of the programme the following solution groupings have been identified. (Aligned with the solution description given above.)

1. Group A – Overarching Projects
2. Group B - Dam Basin Projects
3. Group C – Catchment Projects.

The following diagram (Figure 1) indicates the reporting, management and support functions established in the programme:

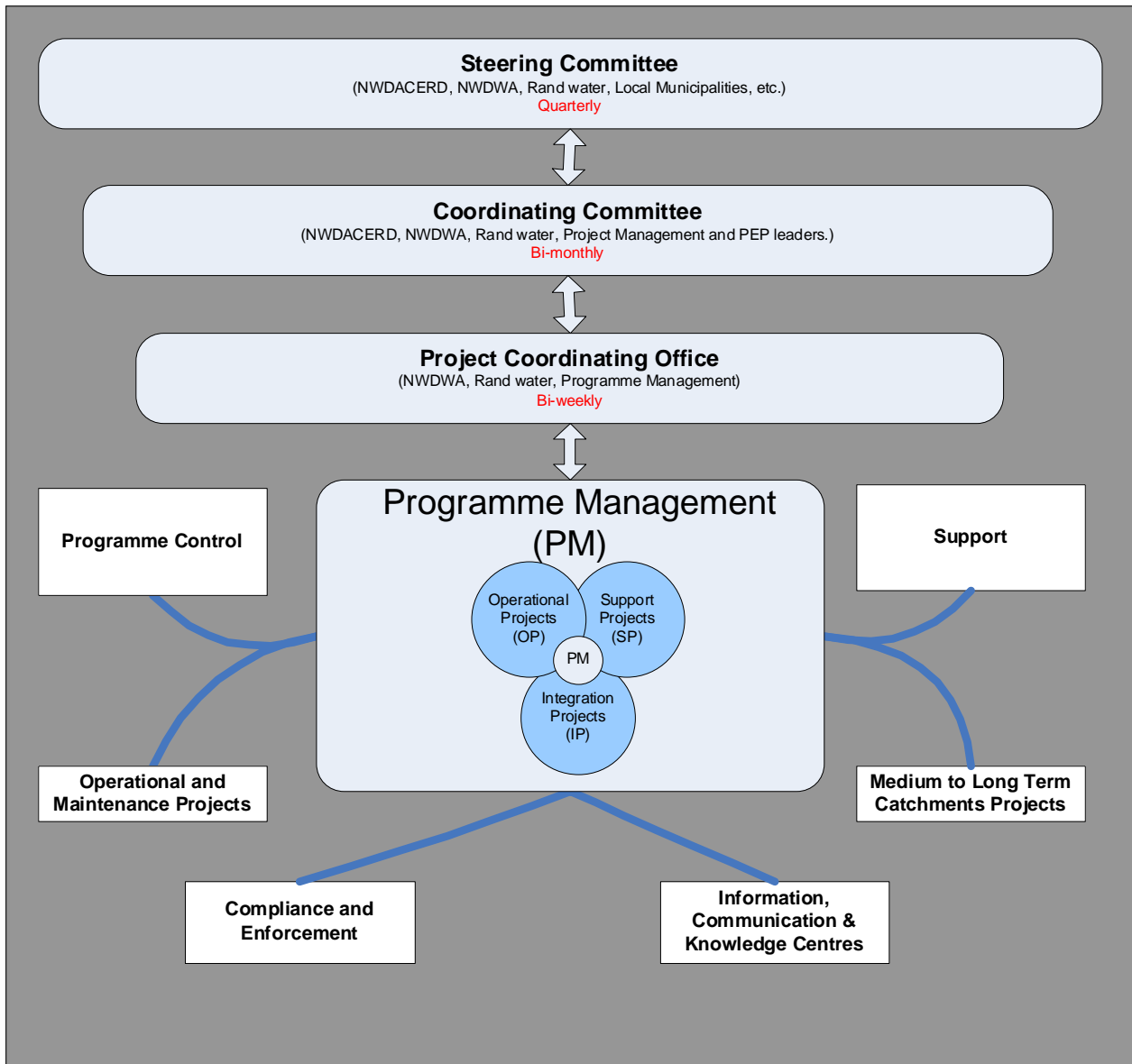


Figure 1: Management and Support Functions of the Programme

Because of the overlaps between the projects they have been crosscut in the following categories whereby roles, responsibilities and deliverables can easily be defined:

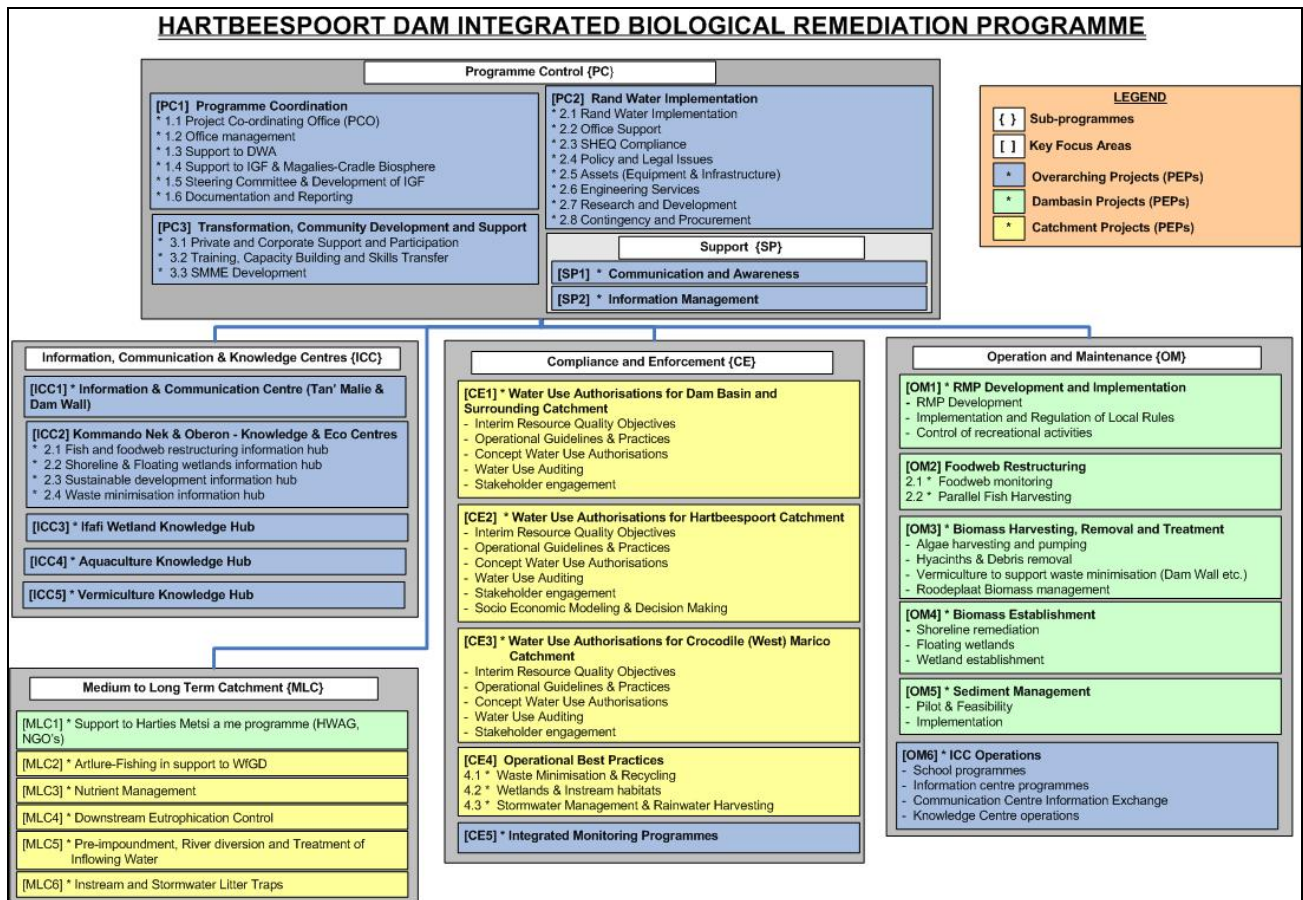


Figure 2: Key Focus Areas and Related PEPs

Details of each project are developed in Project Execution Plans (PEP's) with a PEP leader responsible for the execution of the activity.

Through the Office of the DWA Director General (DG) the Hartbeespoort Dam Remediation Programme was set as a national priority in the Department. Instruction was given in May 2007 by the DG for immediate implementation and fast tracking of the entire programme to give effect to enhancing growth and development in the North West Province. Following this instruction, the programme is established and now in the final operational phase.

Each project will be the responsibility of a dedicated **PEP Leader** who will plan, execute and report on progress within the project scope, time frames and available budget. PEP leaders will be part of the **Hartbeespoort Dam Coordinating Committee (HDCC)** and this committee will be responsible for the overall coordination of the project, while the **Project Coordinating Office (PCO)** will be responsible for the day-to-day management of the project. The **Hartbeespoort Dam Steering Committee (HDSC)** is responsible for guidance on the strategic coordination and integration of the activities and will use the HDCC to implement. A **Hartbeespoort Dam Review Panel** will be established to provide on-going expert opinion/guidance on the progress of the project.

Project Execution Plans (PEPs)

The PEP for each project consists of key milestones and deliverables for each activity with milestone dates and budgets. Key assumptions are also defined, while the interdependencies with other activities and key concerns as well as risks are described. A PEP has been developed for each project as indicated in Table 1.

Table 1: Programme Layout including various Project Execution Plans

Sub Programme		No.
Key Focus Area		
PEP Name		
Programme Control		PC
Programme Coordination		PC1
	Project Co-coordinating Office	PC1.1
	Office Management	PC1.2
	Support to DWA	PC1.3
	Support to IGF & Magalies Cradle Biosphere	PC1.4
	Steering Committee & Development of IGF	PC1.5
	Documentation and Reporting	PC1.6
Rand Water Implementation		PC2
	Rand Water Implementation	PC2.1
	Office Support	PC2.2
	SHEQ Compliance	PC2.3
	Policy and Legal Issues	PC2.4
	Assets (Equipment & Infrastructure)	PC2.5
	Engineering Services	PC2.6
	Research and Development	PC2.7
	Contingency and Procurement	PC2.8
Transformation, Community Development and Support		PC3
	Private and Corporate Support and Participation	PC3.1
	Training, Capacity Building and Skills Transfer	PC3.2
	SMME Development	PC3.3
Support		SP
Communication and Awareness		SP1
	Communication and Awareness	SP1.1
Information Management		SP2
	Information Management	SP2.1
Operation and Maintenance		OM
RMP Development and Implementation		OM1
	RMP Development and Implementation	OM1.1
Foodweb Restructuring		OM2
	Foodweb monitoring	OM2.1
	Parallel Fish Harvesting	OM2.2
Biomass Harvesting, Removal and Treatment		OM3
	Biomass Harvesting, Removal and Treatment	OM3.1

Sub Programme		No.
Key Focus Area		
PEP Name		
	Biomass Establishment	OM4
	Biomass Establishment	OM4.1
	Sediment Management	OM5
	Sediment Management	OM5.1
	ICC Operations	OM6
	ICC Operations	OM6.1
Compliance and Enforcement		CE
	Water Use Authorisations for Dam Basin and Surrounding Catchments	CE1
	Water Use Authorisations for Dam Basin and Surrounding Catchments	CE1.1
	Water Use Authorisations for Hartbeespoort Catchment	CE2
	Water Use Authorisations for Hartbeespoort Catchment	CE2.1
	Water Use Authorisations for Crocodile (West) Marico Catchment	CE3
	Water Use Authorisations for Crocodile (West) Marico Catchment	CE3.1
	Operational Best Practices	CE4
	Waste Minimisation & Recycling	CE4.1
	Wetlands & Instream Habitats	CE4.2
	Stormwater Management & Rainwater Harvesting	CE4.3
	Integrated Monitoring Programmes	CE5
	Integrated Monitoring Programmes	CE5.1
Information, Communication and Knowledge Centres		ICC
	Information & Communication Centre	ICC1
	Information & Communication Centre (Tan' Malie & Dam Wall)	ICC1.1
	Kommando Nek & Oberon – Knowledge & Eco Centre	ICC2
	Fish and Foodweb restructuring information hub	ICC2.1
	Shoreline & Floating wetlands information hub	ICC2.2
	Sustainable Development information hub	ICC2.3
	Waste minimisation information hub	ICC2.4
	Ifafi Wetland Knowledge Centre	ICC3
	Ifafi Wetland Knowledge Centre	ICC3.1
	Aquaculture Knowledge Centre	ICC4
	Aquaculture Knowledge Centre	ICC4.1
	Vermiculture Knowledge Centre	ICC5
	Vermiculture Knowledge Centre	ICC5.1
Medium to Long Term Catchment Management Strategies		MLC
	Support to Harties Metsi a Me Programme	MLC1
	Support to Harties Metsi a Me Programme (HWAG & NGO's)	CMS1.1
	Aquaculture and Artlure Fishing Catchment strategy in support to WfGD	CMS2
	Aquaculture Hub	CMS 2.1
	Artlure Fishing in support to WfGD	CMS 2.2
	Nutrient Management	CMS 3
	Nutrient Management	CMS 3.1
	Downstream Eutrophication Control	CMS 4

Sub Programme		No.
Key Focus Area		
PEP Name		
	Downstream Eutrophication Control	CMS 4.1
	Pre-impoundment, River diversion and Treatment of Inflowing Water	CMS 5
	Pre-impoundment, River diversion and treatment of inflowing water	CMS 5.1
	Instream and Stormwater Litter traps	CMS 6
	Instream and Stormwater Litter Traps	CMS 6.1

Programming and budget

The remediation programme is a long term project with some activities stretching over several years. Development of the RMP and implementation thereof will take place concurrently. The project will allocate time from project development and orientation to Institution Management up to the point where the appropriate Water Management Institution (WMI) is formed and capacitated to take over the relative functions.

Key concerns and Risks

Some of the key concerns and risks raised during the planning stage of the project follow below with mitigation measure how to manage these risks:

1. Funding for the proposed interventions and activities – DWA will have to approve an annual budget for the next 3 years top up with the recovery of Mitigation Charges to be recovered from the Waste Discharge Charges in the upper Catchment, as well as an effective Corporate and Private Support PEP to facilitate all different supports required and needed to sustain the programme,
2. Effective communication and involvement of stakeholders – The communication and awareness project team will have to integrate and broaden their communication strategy to all stakeholders in and around the catchment area (both national and international interest),
3. Duplication of Stakeholder communication – route all communication through the communication and awareness project team to prevent and reduce stakeholder fatigue,
4. Integration of PEPs – Rand Water as Implementing Agent to source suitable PEP leaders and specialists on projects to ensure effective integration and implementation of the programme
5. Ensure compliance with legal and other regulations (e.g. Environmental Regulations) - Identify as soon as possible applicable regulatory requirements and affected activities, and initiate the necessary processes to ensure timely compliance through the inter governmental steering committee (HDSC),
6. Limitations of PEP leader co-operation – Rand Water as Project Manager to manage teams to obtain full collaboration and harmonization of activities to obtain and ensure optimization and maximum results,
7. Lack of Government support – Steering Committee to promote and attain high level government support, buy in and involvement, and
8. Ensure constant compliance with the Public Finance Management Act, imply concurrent compliance with DWA and RW procurement requirements while paying special attention to managing the complex developmental aspect.

Programme Challenges

One of the biggest challenges of the project is the large number of stakeholders and upstream impacts that require behaviour change to ensure the introduction of less wasteful life styles. The equal large number of differing practical opinions regarding the different biological and physical aspects related to the integrated biological models within the remediation programme. Effectively the HDRP will accommodate the view of the multitude and obtain their buy-in, but more importantly be committed to the implementation of the most cost effective, practically implement able, manageable and sustainable model.

The large and ever increasing dense urbanised area upstream of the dam (catchment) and the different sectors / institutions that impact differently on the water resource quality from point sources (Waste Water Treatment Plants) and diffuse sources (storm water) should be addressed with appropriate Catchment Management Strategies to attend and address each different case in an integrated manner.

Further challenges include how to monitor impacts of the programme (positive or negative, if any) how to engage with Local Authorities that need capacity to adhere to effluent standards of the DWA and also how to manage diffuse source pollution. A full scale awareness and education campaign should be introduced to address issues and matters on the dam and environmental in general, to launch the campaign at the different levels of the broader community and to ensure that the core message in the programme reach all.

In summary, the core challenges will be to ensure that the following be addressed:

1. Apply Integrated Environmental Management and Integrated Water Resource Management principles,
2. Introduce Integrated Co-operative Governance (and management),
3. Evaluate against relevant legal and policy/regulatory principles and develop Best Practises and guidelines during implementation,
4. Continuous Social Intervention with Stakeholders, and
5. Implement the integrated remediation programme while developing certain Best Environmental Options (BEOs) for South African conditions.