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Developing markets for watershed protection services and improved livelihoods in South Africa

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Workshop terminology

Catchment	in South Africa the English term catchment is used to define the boundary of an area that drains into a particular water body or river. A catchment is bounded by watersheds, defined as the highest points from which water drains. However, for the purposes of ensuring continuity in this study with the reporting of other study sites, catchment will be used interchangeably with the American description of watershed defined below.
Direct negotiation	where payments for watershed protection services are agreed directly by buyers and sellers. Payments are often embedded within larger projects that set out detailed conservation activities and which involve a lengthy process of bargaining (eg. integrated conservation and development projects)
Exchange-based trades	where a commodity has been standardized and can be resold in secondary and, in some cases, derivative markets such as futures or options markets
General authorisations	refer to users of larger amounts of water, or a water use that could impact negatively on the water resource, but which is generally authorized to continue without a license via a notice in the Gazette
Intermediary-based transactions	occur where funds are channeled via intermediaries eg. Trust funds, local and international NGOs. Intermediaries help to reduce transaction costs associated with searching, negotiating and completing deals
Licensed users	all users, other than schedule 1 users, or generally authorized users who use water in terms of a license.
Pooled transactions	involve the pooling of funds by buyers, or pooling of service supplies. Pooling controls trading risks for buyers by sharing the investment among several buyers and, in some cases, by permitting diversified investments
Resource directed measures	Focus on the overall health of the water resource itself and include mechanisms to protect the character and condition of the resource, its riparian habitats and aquatic biota. These include a national classification system, an ecological reserve determined in accordance with the class of the resource, resource quality objectives and a reserve for basic human needs

Source directed measures	Are given effect through the water licencing process and pertain to water use
Market-based instruments	Mechanisms used to generate funds or resources in order to incentivise certain behaviour
National water act	The National Water Act for South Africa (Act No.36 of 1998)
Water entitlements	all water use authorised according to criteria of equitable allocations, beneficial use in the public interest, and environmental values. This excludes the reserve, international obligations, interbasin transfers, strategic needs and future use
Water rights	under the NWA (Act 36 of 1998), the only right to water is conferred for the reserve, this includes the reserve for basic human needs and the ecological reserve. This reserve allocation remains a national responsibility
Schedule 1 users	users of small amounts of water for household use, watering gardens and animals (not for commercial purposes) or storing and using rainwater from a roof
Stream flow reduction activities	“...any activity...[that]...is likely to reduce the availability of water in a watercourse relative to the natural runoff from that area” under section 36(2) of the NWA (Act No. 36 of 1998)
Watershed services	services that facilitate the regulation of water flows, volumes, quality and timing downstream
Watershed	a geographic region within which water drains into a particular river, stream, or body of water. The overall health of a watershed is linked to the health of the surrounding land and rivers or streams within that region. In South Africa a watershed is referred to as a catchment
Water resource quality directed measures (WRQDM)	specify the quantity and quality of water which is required to meet the needs of the reserve and class of the resource

1. Introduction to the project

Water is considered as the most essential of all natural resources, fundamental and indispensable to both ecological functioning, and social and economic development (Tietenberg, 1992; Hudson, 1996; Ashton, 2002a; Ashton & Seetal, 2002; King, 2002). Globally, water is classified as a scarce resource, scarce in terms of quality where the physical supply is abundant and high levels of pollution and recycling limit access to clean water; and scarce in terms of quantity where climate changes and use patterns are rapidly dwindling established supply sources (OECD, 1987; Tietenberg, 1992; Kahn, 1998; King, 2002). Further constrained by the increasing demands of population growth, industrialisation and urbanisation, resource depletion and pollution are an ever-increasing reality in many countries (Falkenmark, 1994, 1999; Rosegrant, 1997; Gliick, 1998; Ashton, 2002a; Ashton & Seetal, 2002; King, 2002). Supply-side solutions are becoming less feasible due to the high associated expenses and limited exploitable potential as such demand-side solutions are proving to be more attractive (Delli Priscoli, 1998; Ashton & Seetal, 2002; King, 2002).

Current thinking in many countries acknowledges that water resources are an economic good and hence should be defined within a market structure and allocated according to some 'efficient' market price. However due to the nature of water as a social, financial, economic and environmental resource that is subject to spatial and temporal changes it is not easy to determine an appropriate set of prices, let alone establish a clearly defined marketing system within which the resource or associated attributes can be traded (McDonald, 1988; World Bank, 1993; Winpenny, 1994; Kay et al., 1997; King, 2002).

The need for improved watershed (catchment) management is therefore well recognised in many countries as a means to improve the provision of adequate and clean water supplies for agriculture, industry and domestic use (both rural and urban). One such approach is the protection of watershed services, services that can potentially be supplied by different users and demanded by others. The underlying premise hinges on the understanding that by compensating land users for the provision of environmental services an incentive is created for land users to incorporate these services into their land use planning decisions thereby internalising the related costs and benefits. Such markets provide both a necessary and fundamental opportunity to provide creative solutions for the management of watersheds and sustainable livelihoods. In a country such as South Africa where equity redress, poverty alleviation and developmental goals are as much part of the national imperative as the sustainable and "profitable"¹ utilisation of natural resources, markets for environmental services make good sense (economically and socially), provided the supporting mechanisms are clearly defined and carefully established. A global initiative funded by the U.K. Department for International Development, *developing markets for watershed protection services and improved livelihoods*, which is being implemented by the International Institute for Environment and Development (IIED) in collaboration with local partners in eight countries, is currently underway. The aim of which is to determine the extent to which markets for watershed protection services can be established and in turn address issues around improving livelihoods.

Due to the progressive developments around catchment management and the ambitious goals set out by the National Water Act (Act no. 36 of 1998) (DWA&F, 1997a), the Water Service Act No. 108 of 1997 (Annon, 1997), and the Water Resource Strategy (2002), coupled with

¹ Profitable here means achieving the highest possible return for one use over another.

historical inequalities and discrepancies in the quality of livelihoods, South Africa was selected as one of the eight case study countries for potentially piloting *markets for watershed protection services and improved livelihoods*. This diagnostic presents the findings of a scoping study conducted under phase 1 of the above-mentioned global initiative for the action-learning site, South Africa. The diagnostic is set out as follows:

- Section 2 reviews the nature of markets and market-based instruments,
- Section 3 and 4 introduce the context for South Africa's watersheds including policy regimes, water-land linked management practices and key stakeholders,
- Section 5, 6, 7 and 8 introduce watershed services in South Africa, key opportunities and constraints, needs and relevant projects.

2. Overview of markets for watershed protection services in South Africa

Markets for watershed protection services do not formally exist in South Africa, although numerous research initiatives and practical projects address the issue in an indirect way and are discussed in greater detail later in this document. For markets for watershed protection services to exist a number of necessary requirements are recognised in traditional neoclassical literature as being of importance. They are the following:

- Buyers and sellers need to exist and be interested in trading;
- Costs of participating in trading (transaction costs) need to be low;
- A legal or supportive institutional framework that supports trading needs to be evident;
- Property rights must be clearly defined, often particularly difficult when it comes to watershed protection services;
- Goods or services need to be priced correctly where there are direct markets for them, obviously for watershed services many of these do not have explicit values attached;
- Information must be freely available and accessible.

However, the above-mentioned requirements can be adjusted to meet the needs specifically for markets for watershed protection services as follows. There is a need for:

- Legal guidelines;
- Integrated regulatory frameworks;
- Capacity building and guidelines to administer trading;
- Defined relationships between land-use and water needs;
- Clearly identified magnitude and direction of benefits;
- Institutional monitoring of the flow of benefits from watershed services;
- Clearly defined linkages with the water policy framework.

When considering markets and the establishment thereof, careful consideration needs to be made of:

- The inter-linkages between watersheds and watershed activities;
- Social equity needs within and between watersheds;
- Discrepancies in power bases between demanders and suppliers of watershed services;
- National water use efficiency requirements; and
- Broader national objectives relating to water and land use as well as development;

The following market-based instruments are used internationally to develop markets for watershed protection services and improve livelihoods and have the potential to be applied effectively in South Africa. They are generic and have been identified by Landell-Mills and Porras, 2002, for all developing countries:

- Tradable licences or rights
- User charges
- Intermediary-based transfers
- Pooled transactions
- Internal trading
- Clearing house mechanisms
- Retail-based market

South Africa is a country that faces the complexities of managing forests, land and water resources within the context of sustainable development, the attainment of equity in access and use of natural resources, and the associated redress. Market-based instruments provide creative solutions to meeting the demands by different users for natural resources while simultaneously addressing the needs for creating sustainable livelihoods and are explored further in this diagnostic.

3. The context of South Africa's catchments

South Africa is situated at the southern most tip of the African continent and is bordered by four countries namely, Namibia, Botswana, Zimbabwe and Mozambique. Regarded as the economic powerhouse of the South, South Africa exports extensively to many neighbouring countries, including large quantities of electricity, a commodity highly dependent on water supplies. The country has a total surface area of 1,2 million km² and is mapped by a number of perennial rivers, many of which are shared by its bordering countries, for example, the Orange River, shared by Namibia and Lesotho and the Crocodile River shared by Swaziland and Mozambique (King, 2002). Rivers are the main source of water in South Africa and approximately 77 percent of the population of 45,5 million have access to safe water (DBSA, 1998). Due to large income discrepancies the ability of large sectors of the population to cover the costs of service provision are limited (DBSA, 1998). Figure 1 below, geographically depicts the country. The provincial boundaries are shown in black, the water management boundaries are shown in red with major rivers in blue.

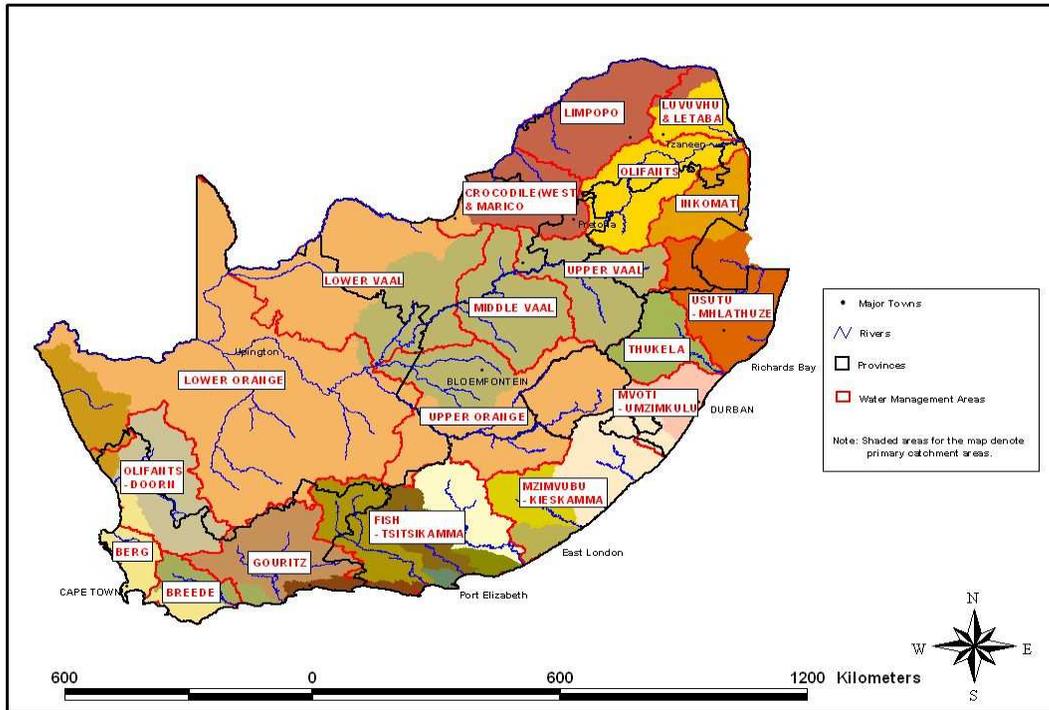


Figure 1: Water management areas and provincial boundaries of South Africa

Source: Crafford *et al.*, 2001

The surface area is highly diverse and many areas of the country are regarded as geo-bio hotspots. This is not surprising due to the extensive natural diversity evident in many parts of Africa. Divided into 9 provinces, the country supports a variety of economic activities ranging from agriculture and forestry through to mining, manufacturing and others. Accordingly, the five major water-using sectors in the country are agriculture, industry, urban, afforestation, and the natural environment, figure 2. Irrigation agriculture represents 54 per cent of the total water demand in South Africa and is mainly consumptive use. Both the industrial (including mining) and the afforestation sectors use eight per cent of the total surface water respectively. The urban and domestic water use estimate is associated with major metropolises and does not include rural domestic supplies (Basson, 1997; DWA&F, 1986; Crafford *et al.*, 2001; King, 2002)

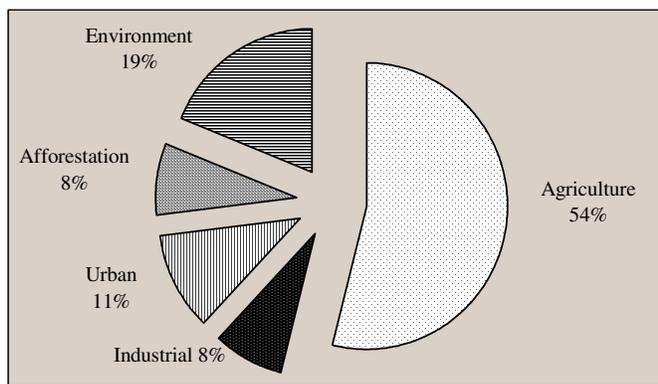


Figure 2: Distribution of demand for surface water in South Africa

Source: CSIR, 1998; King, 2002

South Africa currently reflects one of the largest gini-indexes as recorded by the United Nations Development Programme, outlined in table 1, below. The gini-index measures inequality over the entire distribution of income or consumption, a value of zero reflects “perfect” equality and a value of one hundred reflects “perfect” inequality, respectively. When compared to its neighbouring countries, South Africa has the second largest gini-index after Swaziland, for the region. However, this is supported by the second highest per capita GDP income after Botswana and the lowest projected population growth rate for 2000-2025. When faced with these projections it is not surprising that the demands of resource dependent livelihoods and widespread poverty further impact already stressed resources such as land and water.

Table 1: Comparative population and income statistics for the Southern Africa region

Countries	Per capita GDP (US\$)	Population (millions)	Population growth rates (1980-2000) / (2000-2025)		Gini index
USA	34,637	281.6	1.1	0.8	40.8
UK	24,058	59.7	0.3	0.0	36.8
South Africa	2,954	42.8	2.2	0.5	59.3
Namibia	1,981	1.8	2.9	1.2	-
Botswana	3,225	1.6	2.8	0.6	-
Zimbabwe	572	12.6	2.9	0.7	50.1
Mozambique	195	17.7	1.9	1.7	39.6
Swaziland	1,507	1.0	3.1	1.3	60.9
Lesotho	448	2.0	2.0	0.8	56.0

Source: UNDP, 2002 and the World Bank, 2002

In conjunction with the high levels of income inequality in South Africa, unemployment rates are also high. Many progressive policies have been instituted in an attempt to address the social needs evident in the country. These include the Water Services and Sanitation Act, the Reconstruction and Development policy, the GEAR policy, the South African Constitution and the Land Reform Programme and Development Facilitation Act (1995).

In response to the emerging demands on water resources, the Department of Water Affairs in South Africa has also undergone a major reform in its water policy evidenced by the compilation of the New Water Act (Act No.36, 1998). The Act addresses issues of equity distribution, efficiency in water use and recognises a reserve allowance to meet primary and environmental water needs. It also discusses the importance of allocating a ‘true value’ to the nation’s water resources. The South African government is determined to redefine water resources as national assets and to establish pricing mechanisms that ensure that efficiency goals are met in conjunction with equity and socio-political goals. In order to meet these policy goals, the country has been divided into 19 water management areas as the decentralisation of water management is being encouraged and this is to be supported through the establishment of Catchment Management Agencies (discussed in greater details below).

3.1 The nature of water and the water cycle in South Africa

South Africa is currently classified by the International Water Management Institute as approaching a situation of *absolute water scarcity*, with an average annual precipitation of

about 500 mm, dispersed variably both spatially and temporally throughout the country. The government estimates that the country will reach the limits of economically usable, land-based fresh water resources in the first half of this century. Despite the country's extensive infrastructure developments and technological efforts, it is becoming increasingly costly and less viable to access exploitable water resources and new 'creative' approaches to meeting water demands are required (Darr et al., 1976; World Bank, 1995; Hassan, 1997; Tate et al., 1992; Haasbroek et al, 1998; Crafford et al., 2001; King, 2002; Landell-Mills, 2002). In short, water demand management approaches provide, to some extent, the 'creative solutions' currently required to achieve the efficient allocation and use of water resources, including interventions at three levels of water management, namely, allocation, application and productivity (Ashton & Turton, 1999).

Another element to the nature of water resources management that is becoming increasingly pertinent to South Africa is the social adaptive capacity of society to deal effectively with water scarcity. By investing in coping skills across different sections of society, one is able to encourage society to invest in using water productively, thereby creating an environment of structurally-induced water abundance and avoiding second order water scarcity (Turton, 1999; Turton & Ohlsson, 1999; Ashton, 2002a,b; Ashton & Seetal, 2002). South Africa is currently faced with the scenario in quadrant 1 in figure 3 below, depicting the situation where society is experiencing first order water scarcity with limited water supply and a changing environment regarding societies ability to adapt to water scarcity. The aim for society is to move into quadrant 4, where society is fully informed and empowered to adapt to water scarcity. In order to achieve these changes, government responses to water scarcity need to be carefully managed and all stakeholders need to be fully-informed. The potential for watershed protections services and related markets to address the water scarcity gap and improve livelihoods under the umbrella of demand management tools, requires a shared understanding of best practices in different catchments. Including clarity on catchment management goals and strategies across the country. These need to be established and effectively communicated to all water users.

		Relative ability to develop and adopt coping strategies	
		<i>Low</i>	<i>High</i>
Relative availability of water per person	<i>Scarce</i>	Water poverty	Structurally-induced water abundance
	<i>Abundant</i>	Structurally-induced water scarcity	Water security

Figure 3: A comparison of the likely outcomes for society facing first and second order water resource scarcity or abundance

Source: Figure redrawn from Ashton & Seetal, 2002

3.1.1 Water availability in South Africa

Precipitation is highly seasonal across most of the country and falls over just half of the world average at about 500mm per annum. The interior northern regions of South Africa experience summer rainfall patterns and follow an annual cycle. The south-western Cape region also follows an annual cycle in anti-phase to that of the summer rainfall regions, and experiences most of their rainfall during the winter months. Conversely, the narrow southern Cape coastal belt and interior regions receive precipitation uniformly throughout the year, while a weak semi-annual cycle is experienced in the arid western-central regions. This pattern of spatial and temporal variability in precipitation across the country is further interrupted by an eighteen-year wet-spell/dry-spell cycle (Tyson, 1986; Crafford *et al.*, 2001).

Furthermore, much of South Africa is belied by hard rock formations that do not support underground aquifers, so the country is poorly endowed with groundwater (DWA&F, 1986; Crafford *et al.*, 2001). Occurring in either secondary or localised aquifers and rarely primary aquifers, the water situation assessment model (WSAM) estimates the annual groundwater use in South Africa to be about 1,4 billion m³ per annum (DWA&F, 2002a; Crafford *et al.*, 2001). This poor endowment of ground water combined with high evaporation rates and the direct demands of a population currently growing at an average annual rate of between 2,2 and 0,5 percent (DBSA, 1998; World Bank, 2002), places further pressures on its scarce surface water resources (King, 2002). It is expected that the maximum quantity of groundwater that will be practically and economically feasibly to develop in the future is estimated to be about 5,4 billion m³ per annum (DWA&F, 2002a).

South Africa's water sector is often likened to a large plumbing system due to its intricate network of inter-basin transfer schemes and multiple sources of supply, namely, surface water run-off from rainfall, ground water, unconventional water sources, reuse of effluent returned to public streams, and water imports from other countries" (DWA&F, 1986; King, 2002). The water balance for South Africa is depicted in figure 4, below. This shows the level of complexity facing water management decision-makers. The left-hand side depicts the flow of water through the system, beginning with the extraction of water from nature (either through rainwater capture or through groundwater extraction), moving through distribution, production and consumption uses, and disposals, finally showing the impacts of return flows into the natural environment.

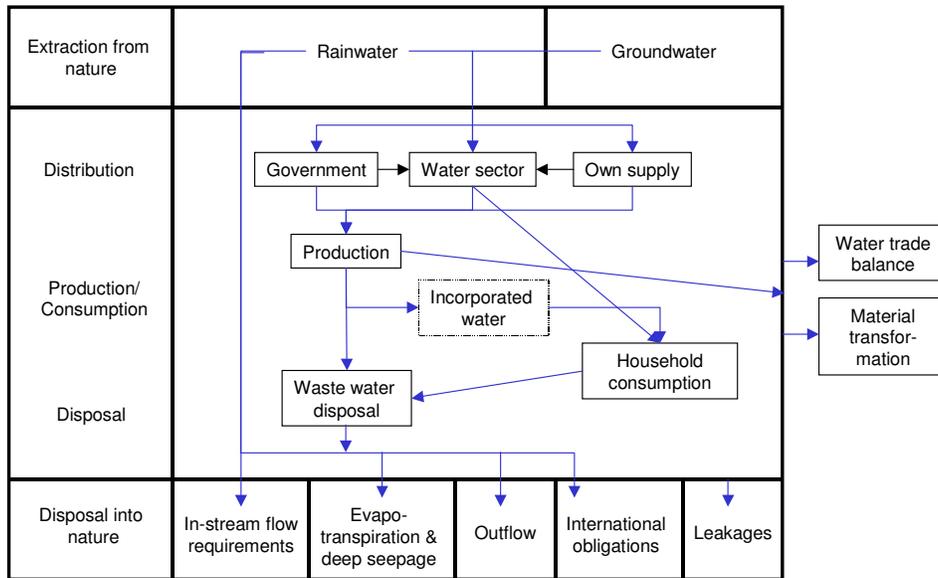


Figure 4: A diagrammatic representation of the flow of water in South Africa

Source: Crafford et al., 2001

Water utilisation in many parts of the country already exceeds available resource potential. This scenario is further exacerbated by the variability in abundance, with the majority of water occurring in the eastern and south-eastern parts, while the greatest demands for water occur in the central region and adjoining areas (Basson *et al.* 1997). Figure 5 below, shows the total local water yield for 2000 and 2025, including baseline and high scenarios against the total local water requirements for the same period. Supply, is estimated to remain relatively constant with minor adjustments for storage under construction in 2000, as is reflected in the 2025 scenarios, and it ranges from 13 911 million m³/a (2000) to 14 681 million m³/a (2025baseline) and 15 460 million m³/a (2025high) respectively. Demand is expected to increase from 13 280 million m³/a in 2000 to 14 486 million m³/a and 17 248 million m³/a in 2025 respectively, thereby potentially reducing the available water surplus from 631 million m³/a to a deficit of 1 788 million m³/a (DWAF, 2002). The Northern, South Western and Central regions are expected to be faced with the greatest water pressures by the year 2030. This is expected as these areas are projected to be the largest economic growth areas. The Eastern Inland and Eastern Coastal regions are depicted to be more water abundant in terms of meeting the regional demands (Basson *et al.*, 1997; King, in press).

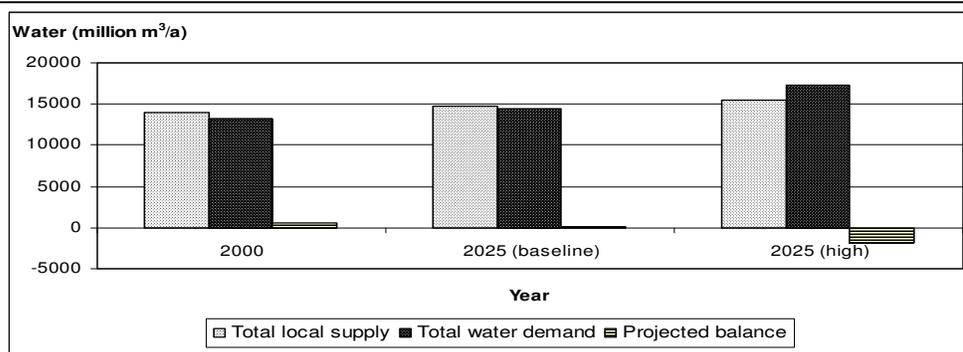


Figure 5: Demand and Supply balances for water (over time) in South Africa, excluding transfers

Source: Reproduced from King, in Blignaut and de Wit, in press.

The regional growth in water demand depicted above is further disaggregated by sectoral demands per water management area for the year 2000 shown in Table 2 below. Indications are that irrigation and urban use are the largest water using sectors, followed by mining, rural demand, afforestation and ultimately power generation. The Crocodile West and Marico, the Upper Vaal and the Inkomati Water Management Areas are currently experiencing the highest demand and are projected to approach water stress and scarcity first if demand continues to grow in these areas. Based on the currently observable trends of urbanisation and economic growth, it is expected that future water requirements will increase in the urban areas, with a growth in demand for mining use in the northern parts of the country (DWAF, 2002; King, in press).

Table 2: Current water requirements per sector and water management area in South Africa (million m³)

Water Management Areas	Irrigation	Urban	Rural	Mining and Bulk Industrial	Power Generation	Afforestation	Total Local Requirements	Total Local Yield	Deficit or Surplus
Limpopo	238	37	28	14	7	1	325	282	-43
Luvuvhu/Letaba	248	11	31	1	0	43	334	310	-24
Crocodile West and Marico	445	691	38	127	27	0	1,328	693	-635
Olifants	557	92	44	94	181	3	971	611	-360
Inkomati	737	65	24	24	0	198	1,048	943	-105
Usutu to Mhlatuze	404	54	40	91	0	104	693	1010	317
Thukela	204	56	31	46	1	0	338	738	400
Upper Vaal	114	795	42	173	80	0	1,204	1723	519
Middle Vaal	159	112	32	86	0	0	389	201	-188
Lower Vaal	525	78	44	6	0	0	653	50	-603
Mvoti to Umzimkulu	207	438	44	74	0	65	828	527	-301
Mzimvubu to Keiskamma	190	100	39	0	0	46	375	855	480
Upper Orange	777	129	60	2	0	0	968	4557	3,589
Lower Orange	780	28	17	9	0	0	834	-1007	-1,841
Fish to Tsitsikamma	763	116	16	0	0	7	902	437	-465
Gouritz	254	57	11	6	0	14	342	277	-65
Olifants/Doring	356	7	6	3	0	1	373	335	-38
Breede	577	43	11	0	0	6	637	868	231
Berg	301	423	14	0	0	0	738	501	-237
<i>Total for country</i>	<i>7,836</i>	<i>3,332</i>	<i>572</i>	<i>756</i>	<i>296</i>	<i>488</i>	<i>13,280</i>	<i>13911</i>	<i>631</i>

Source: Reproduced from King in Blignaut and de Wit, unpublished

The two figures above, evidently show that South Africa is a country facing potentially disastrous consequences in the absence of immediate changes with respect to water utilization and the prevention of economic stagnation based on access to insufficient water (Basson *et al.*, 1997). Fortunately, the National Water Act (Act No. 36 of 1998) provides the framework for such changes currently taking effect. This includes opportunities for the timeous development and implementation of appropriate and creative strategic measures such as that proposed under the role of watershed protection services development.

The water asset table for South Africa as shown in Table 3 below further depicts the extent to which water scarcity is evident in South Africa. The asset table was developed as part of the Water Resource Accounts for South Africa. The asset table indicates the extent to which runoff and groundwater in a particular catchment are available over a long period of time and where potential scarcity problems may occur. Columns 1-6 show water availability and supply interventions, while columns 7-12 show water use.

The table is explained well by Crafford *et. al.*, 2002 as follows:

*“It is immediately apparent that the WMA’s that have **MAR’s** of above 3,000 million cubic meters are the five easternmost WMA’s (Inkomati, Usuthu to Mhlathuze, Thukela, Mvoti to Umzimkulu and Mzimvubu to Keiskamma). This is nearly 45% of the total MAR, which flows a relatively short distance to the sea, eastward. The **groundwater** harvest potential is estimated to be 13 billion m³, although currently only 1.5 billion m³ is harvested annually. It is considered unlikely that groundwater will ever constitute more than 15% of the supply from conventional freshwater sources (WR, 1986).*

*The **dam storage capacity** is currently nearly 60% of MAR, although nearly half of this capacity is concentrated in the centre of the country (Upper Vaal and Upper Orange). Fifteen percent of MAR is **transferred** within or between WMA’s (more detailed analyses of the transfers will be available in later versions of the WSAM).*

*On average, **social, environmental and value adding water use** amount to 4%, 32% and 26% of MAR respectively. This is a total of 73% of MAR, which is high when compared to a global average of 9% (Seckler, 1999). **Urban water use** is approximately 50m³ per capita per day compared to the **rural** figure of approximately 45. The **environmental use** is defined as the so-called In Stream Flow Requirement (IFR) and river losses, and is an estimate of the volume of MAR required for keeping the river habitat intact. Other environmental requirements are considered to be evapotranspiration, sourced directly from precipitation.*

***Value adding use** is classified into three groups:*

- *Stream Flow Reduction Activities*
- *Strategic Use and*
- *Irrigation and Industrial Use.*

***Stream flow reduction** is attributed to the water use activities of certain dry-land farming activities and evaporation. Stream flow reduction is therefore the incremental water use due to these activities (which are associated with value adding activities) as opposed to the natural state of the environment. Stream flow reduction activities effectively reduce the MAR by 5%. These activities are most apparent in the wetter WMA’s. MAR for **strategic use** is reserved mainly for activities such as power generation, which amounts to a mere 1% of MAR. Finally, water use by **irrigation and industrial activities** amounts to 19% of MAR.”*

Table 3: Water asset table for South Africa showing average annual water supply and use in million cubic meters (base year 1998)Source: Crafford *et al.*, 2001 based on the RSA WRA Database 1

Data Classification:	A	A	A	A	A	A	A	A	A	A	A	A
Water Management Area	MAR	Groundwater Potential	Groundwater Supply	Storage	Transfers		Household Use		Env. Use	Value Added Use		
					Exports	Imports	Rural	Urban	IFR [#]	IETA*	Strategic	Irr+Ind**
Limpopo	985	335	38	329	-	14	58	14	83	18	4	444
Luvuvhu / Letaba	1,185	158	63	555	15	3	63	5	519	119	-	348
Crocodile West and Marico	786	400	87	891	49	466	72	217	197	5	38	672
Olifants	2,042	504	101	1,199	3	115	69	43	1,148	162	177	975
Inkomati	3,026	271	75	464	100	134	25	24	2,062	684	32	643
Usuthu to Mhlatuze	4,612	1,227	24	3,586	281	74	51	18	870	459	45	475
Thukela	3,982	228	133	1,264	496	26	35	22	1,402	86	39	224
Upper Vaal	2,594	605	115	6,004	1,106	669	61	314	152	20	245	339
Middle Vaal	1,183	457	269	651	154	153	42	39	81	1	4	235
Lower Vaal	467	900	24	1,375	358	359	64	29	-	3	1	471
Mvoti to Umzimkulu	4,899	390	52	899	269	260	41	107	897	549	72	340
Mzimvubu to Keiskamma	7,196	608	11	1,183	20	18	60	42	1,148	182	-	190
Upper Orange	2,353	715	63	9,283	803	155	38	43	3,598	2	2	510
Lower Orange	491	709	84	339	25	12	20	12	1,122	3	-	748
Fish to Tsitsikamma	2,154	890	63	935	343	63	24	46	27	117	-	1,005
Gourits	1,668	678	19	336	74	73	10	18	79	178	6	567
Olifants / Doring	1,095	391	77	262	37	38	5	3	0	21	-	553
Breede	2,472	564	80	918	241	97	12	17	80	170	-	728
Berg	1,431	315	32	206	209	354	14	223	15	112	-	819
Y-Z [@]	2,949	2,463	33	416	-	-	26	2	997	0	6	42
Lesotho [@]	4,644	275	3	3	-	1	1	12	1,496	1	-	13
Swaziland [@]	2,463	296	4	220	88	88	13	1	1,703	65	12	306
Total	54,677	13,379	1,449	31,318	4,672	3,172	804	1,249	17,676	2,956	683	10,648
Ratios: % of MAR	100%	25%	2.7%	57%	9%	6%	1.5%	2.3%	32%	5%	1.2%	19%
							4%			26%		

IFR = In Stream Flow Requirements

** Irr+Ind = Irrigation and Industrial Use

* IETA = Induced evapotranspiration Activity

@ Note: Data used for the Asset Table was extracted from the WSAM, which, due to the fact that it is still in its programming development phase, could not yet provide output 100% in terms of Water Management Areas. For this reason, three extra rows were added for Lesotho, Swaziland and the Y-Z primary catchment areas.

3.2 Policy, legal and institutional frameworks for catchment management in South Africa

South African policy has undergone a multitude of changes since 1994. The most notable of which was the development of a constitution recognised as one of the most inclusive and representative of all constitutions worldwide. Fundamental to the constitution is the right of all South African's to an improved quality of life. Supported by policy reforms such as the Land Reform Programme, the Reconstruction and Development Programme (RDP), the Growth, Economic and Redistribution Strategy (GEAR), the National Water Act, the Water Services Act, the National Forest Act, the National Environmental Management Act and the Development Facilitation Act, the role of rights for all South Africans to have access to an environment that is safe and protected across all generations is prioritised.

Another key area of reform in the country involved the drafting of a new Water Act (Act 36 of 1998) that was carried out in the context of broader national reform including land reform initiatives. Four major on-going government processes associated with the policy set out in the National Water Act include:

- 1) **Establishment of Catchment Management Agencies** – CMAs are expected to be the lead water management institution, responsible for implementing catchment management strategies at the local level. Initially DWA&F will retain catchment management responsibilities and functions, but these will be devolved as CMAs are established and local capacity is developed.
- 2) **Compulsory licensing** – in an effort to ensure water is allocated to maximise efficiency, to ensure sustainability and to redress past inequities, the government is obliged to implement a system of compulsory licensing in water stressed catchments. This process is complex as well as contentious as it necessarily involves trade-offs as water is reallocated. Among the many factors being considered, license trading is on the agenda as a potential mechanism to facilitate allocation.
- 3) **Raw water pricing** – DWA&F has developed a raw water pricing strategy that it will begin to implement from April 2002. Initially charges will be focused on cost-recovery, taking into account of water resource management and infrastructure fixed and variable costs, though in many cases, the phasing in of full-charges is expected. Careful attention is also being given to equity impacts.
- 4) **Land Reform** - in addition to existing land redistribution and land restitution processes, a Land Rights Bill is being drafted. This Bill will attempt to deal with complex issues associated with finding a balance between formal and traditional property rights systems in communally held areas. The issue of water rights reform is closely tied to land rights reform, as the value of land is often dependent on unlocking rights to water.

The following section briefly reviews the most relevant policy reforms and their implications for the development of markets around watershed protection services in South Africa.

3.2.1 *The South African Constitution*

Intrinsic to the South African constitution is the drive for the protection and promotion of human rights, social justice and equality, and respect for human dignity. All of which are dependent to varying degrees on the sustainable development of the natural environment. Accordingly, the constitution makes specific provision for the right to:

- 1) access of all South Africans to sufficient water;

- 2) access to land for all citizens on an equitable basis;
- 3) enjoy economic, social, cultural and political development;
- 4) an environment that is not harmful to well-being that is protected for present and future generations through:
 - a. the prevention of pollution and ecological degradation;
 - b. promoting conservation;
 - c. securing ecologically sustainable development and use of natural resources while promoting economic and social development.

Such a broad reach of goals across the many natural resources within South Africa creates the need for alternative ways in which to address issues of poverty reduction and livelihood improvement while at the same time promoting the conservation and protection of natural resources.

3.2.2 The South African water policy and institutional framework

The main aim of the new water law is captured succinctly in the departmental statement “Some, for all, forever”. Promulgated to redress past inequities and inefficiencies associated with water resource management, the law emphasises the fact that water is a limited resource, that fairness in access to water is imperative and that water and water-linked ecosystems need to be mindfully conserved and managed (Palmer *et al.*, 2002). Of the many important reforms introduced by this legislation, a critical shift has been the adoption of the concept of integrated catchment management and the recognition of the importance of land management to the delivery of regular and high quality water services.

While the National Water Act (NWA) is widely praised for its vision and balanced approach to dealing with social, economic and environmental concerns, operationalising its guiding principles will take time. The Act authorises the creation of a number of water management institutions that will be needed to implement its provisions, depicted in figure 7, below. Key amongst these are Catchment Management Agencies (CMA) that will be responsible for implementing integrated catchment management at the local level.

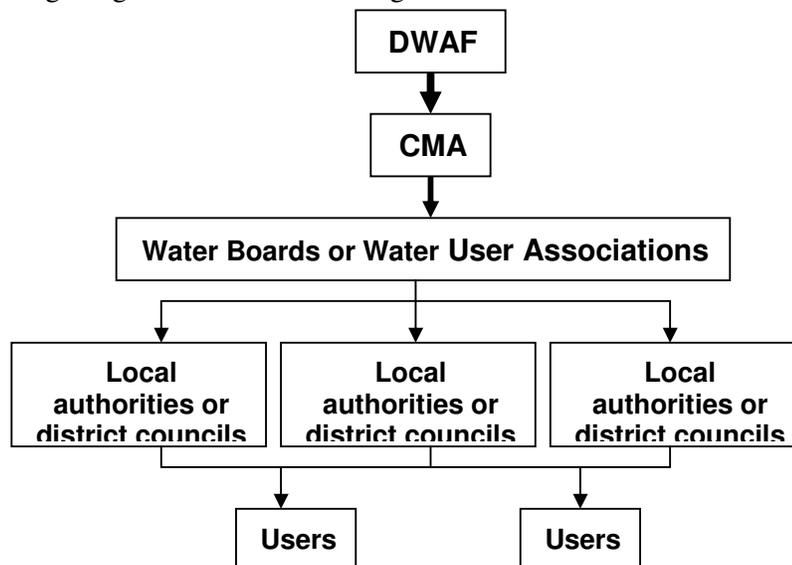


Figure 7: Water supply hierarchy for South Africa

Source: Reproduced from King, 2002

The Act also introduces regulatory and market-based tools for achieving its goals. Water use licensing and charging are two key instruments. The NWA requires that all water users be registered and that they must obtain licenses for water use and pay the associated charges for this use. Water users are defined as those who abstract and store water, reduce stream flow, have a negative impact on water quality or use water for recreation². Land managers are important water users and are thus subject to water licensing and charging (Landell-Mills, 2002; DWAF, 2002). Mechanisms for water regulation at the initial licencing phase are shown in table 4, below. As these mechanisms relate to the level of increasing risk the user will have on the overall quality, functioning and availability of the natural resource they serve as an initial indicator as to the type of user and the likelihood that the user will be more inclined to engage in processes, discussion and ideas around the role of markets for watershed services as a means to reduce the risk of many of their water use associated impacts.

This licencing process is also currently under review in South Africa from both a quantity allocated perspective relating to who gets water, when, where and how much, as well as from a quality perspective as decision-makers are increasingly being faced with the need to incorporate user impacts on the sustainability of the resource into decisions around water allocation and use.

Table 4: Mechanisms to regulate water use based on increasing risks of impacts

Mechanisms to regulate water use	Risk, Nature, and Extent of potential impact
Licences	<ul style="list-style-type: none"> ▪ High risk ▪ Reserve needed ▪ Must be registered
General authorisations	<ul style="list-style-type: none"> ▪ Common use ▪ Low risk of impacts ▪ For example: storing less than 50 000m³, disposing of biodegradable wastewater to a soak-away ▪ Registration in most cases required
Schedule 1 users	<ul style="list-style-type: none"> ▪ Widespread use ▪ Minimal or no risk of impacts ▪ For example: raintanks, water for household use ▪ No registration required

Source: DWAF, 2002

Fundamental to this reform process are the following underlying considerations as set out by Quibell, 2003:

- The manner in which water is allocated can have severe economic, political, social and ecological consequences. If allocation reform is too slow social and political consequences will become evident. If the reform is too fast the natural environment may be harmed and economic development may be affected as insecurity around changes impact users decisions;
- Water re-allocation processes must be carried out in such a way as to minimise the impacts on existing lawful users;

² Water users which are exempt from licensing requirements are set out in Section 22, NWA, and include: uses listed in Schedule 1 (i.e. water use for domestic purposes, vegetable gardens, watering animals or recreational use), existing lawful uses, uses covered by General Authorisations or where license requirements have been waived by the responsible authority.

- Water users must be capacitated to use water productively and responsibly;
- Development must be promoted in an ecologically sustainable manner.

Another important element to the National Water Act is the establishment of the reserve. This basically refers to water for two specific needs: basic human needs and ecological needs. Only once the reserve has been determined and water set aside accordingly will water be allocated for any other use. Figure 8, depicts the reserve and how the Department of Water Affairs and Forestry will prioritise the allocation of water in order to ensure resource sustainability, the sustainability of strategic needs, the meeting of international obligations and provision for inter-basin transfers.

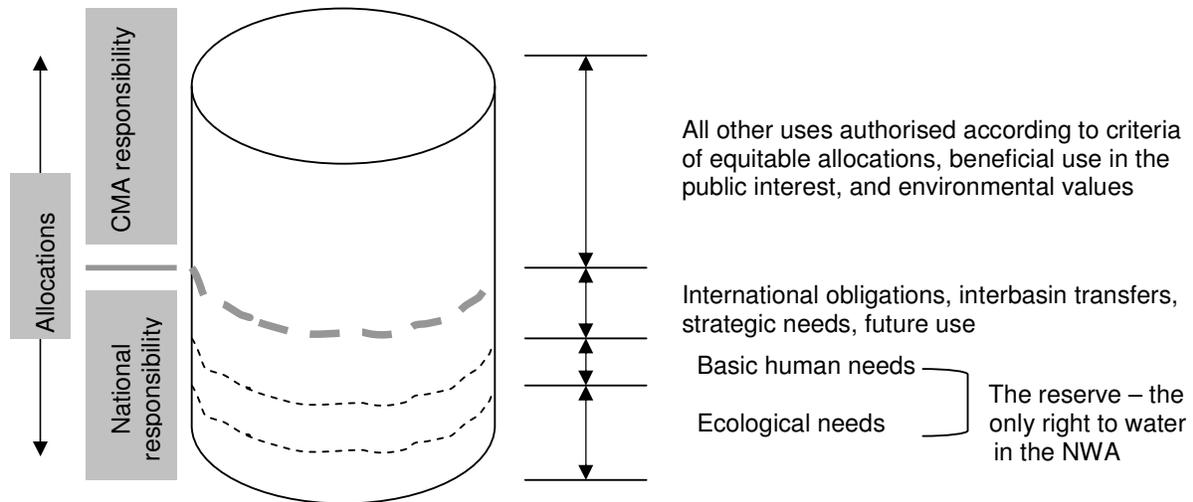


Figure 8: Water allocations prioritisation, including the reserve

Source: Reproduced from DWAF, 2002

The National Water Act, thus, sets the stage for the selective use of market-based approaches to complement regulations in promoting its goals. To date, however, most attention has been on the potential role of market approaches to improve water use – notably in providing price signals to reduce over-use of water (demand management), ensuring cost-recovery and to help in the allocation of water licenses. Less energy has been directed towards designing market-based approaches to address land aspects of water resource management. In particular, using the market to encourage land managers to take account of their impacts on water service delivery, from the provision of regular flows to high quality water. Just as water users are being asked to pay for the costs of delivery and the opportunity costs imposed on others who must forgo water access, a strong case can be made for rewarding land managers for investing in practices that improve water services (Landell-Mills, 2002).

DWAF has made significant progress to date in developing the institutional framework for implementing the National Water Act, yet key challenges remain, the most obvious being the capacity and ability to implement such a progressive policy in the face of high levels of poverty, inequality and varied accessibility to water resources. As evidenced in many of numbers presented in the tables above, water scarcity is an imminent threat to the productivity and development of the South African economy. Mixed views support a complete shift away from supply-side management due to rising associated costs, as many decision-makers in South Africa still believe there is potential for the development of new impoundments over the next ten years. Despite these views, demand-side management is becoming an

increasingly valuable tool available to address water scarcity issues and is being adopted widely in Southern Africa. Markets for watershed services offer both the mechanism to encourage the sustainable use of water resources and the adoption of best practice and behaviours as well as the incentives to do so within the country without resorting to costly supply-side solutions. Adding the potential benefits of including historically marginalized groups and addressing the alleviation of poverty, this approach has far reaching potential benefits. The development of economic mechanisms to manage water resources is already provided for in the new Water Act including pricing and markets. Understanding the true value of water to the economy and the nature of consumer responsiveness to price changes will enable water managers to set water prices at their most efficient and effective levels in order to drive the correct behaviour. Such a mechanism however does not actively allow the poor to participate in the broader water demand as their survival will to a large extent be dependant on subsidization and free access to water for basic human needs. Markets do however, to some extent, provide the framework for broader participation, but markets as they currently exist in South Africa represent informal water trades amongst like uses such as irrigation agriculture farmers, most of which have established property rights, infrastructure and accessibility, relatively low associated transaction costs and clearly defined demanders or sellers with which to trade. By nature then, these trades do not at this stage create space for the participation of emerging traders or subsistence farmers. Markets for watershed services provide a mechanism that enables the shortfalls in the existing market system to be addressed as it allows for development of markets around the provision of the “right” kind of services without focusing specifically on the ownership of a defined water right. Critical to understanding and pursuing this kind of mechanism is the task of designing market-based tools that can internalise the link between land management and water service provision for the benefit of the poor. Table 5 below outlines some of the areas in which different instruments will potentially have the greatest impact in terms of water management. The three phases of water management refer to the allocation process, the way in which water is used or applied and the productivity level of water. Based on this it is clear that there is not necessarily one prescriptive approach to water management but in the context of water scarcity, institutional reform and poverty, markets for watershed services provide a creative approach to meeting water demand needs.

Table 5: Water management instruments and their potential impact

WDM	Phase of management			Require well defined institutional support	Ability to address improved livelihoods
	Allocation	Application	Productivity		
Restrictions and Sanctions	Yes	No	No	Yes	No
Quotas and Norms	Yes	No	No	Yes	Yes
Moral suasion	No	Yes	Yes	No	No
Technology (water loss control)	No	Yes	Yes	No	Yes (if delivered)
Re-use and Recycling	Yes	Yes	No	No	No
Markets for water rights trading	Yes	No	No	Yes/No (currently informal trades occur in the absence of direct governance)	Yes (provided power imbalances are addressed)
<i>Markets for watershed services</i>	Yes	Yes	Yes	Yes/No (dependent on exchange mechanisms)	Yes
Pricing	Yes	No	No	Yes	Yes (subsidisation)

Source: Own compilation

3.2.3 *The National Forestry Act*

The national forestry policy aims to bring together indigenous forest management, commercial forestry and community forestry in such a way as to *promote a thriving forest sector, utilised to the lasting and sustained benefit of the total community in a manner that protects and improves the environment* (DWA&F, 1996). Forest management is no longer regarded as the science of managing forest land but more so as the understanding and managing of the relationships between people and livelihoods dependent on forest resources including the use of forest woods, fruits and other products as well as hunting and gathering of forest wildlife. In accordance with the Forest Principles of Agenda 21, South African forest policy includes *forests of all kinds*.

Fundamentally, the National Forestry Act of 1998 aims to ensure and promote the sustainable management and development of forests for the benefit of all. This includes the sustainable use of forests for environmental, economic, educational, recreational, cultural, health and spiritual purposes. As well as the encouragement of greater participation in the forest and forest products industries by historically disadvantaged individuals. One of the principles of National Forestry Act of 1998, Section 3, is that forests must be developed and managed so as to conserve natural resources especially soil and water.

The impact of afforestation on water supplies has been an ongoing controversy since the 1920's and continues today at various levels. Today plantation forestry is estimated to consume about 488 million cubic meters (DWAF, 2002) but this figure is widely debated and other estimates push this figure closer to the 1 billion cubic meters level when an average conversion factor of 100mm per hectare is used for water that potentially would otherwise have entered rivers and streams or been available for other uses. Afforestation is now classified as a stream flow reduction activity in South Africa according to the National Water Act (Act 36 of 1998). This basically means, "the increased water use anticipated from a proposed forestry development should be assessed in relation to all demands for water downstream of the development" (DWAF, 1996). Options relating to forestry development must be assessed in terms of the "most favourable" economic option taking into consideration community needs, downstream user demands and international obligations as well as aquatic functioning. The term stream flow reduction refers to the amount of water that is being consumed over and above what would have historically been used if the land had remained naturally forested or grassed. As a result the relationship between forestry development and water conservation is relatively complex and has come under much debate over the past few years, today however, the forestry sector actively strives to work closely with the Department of Water Affairs while at the same time conducts many relevant studies within the industry to ensure and encourage a good understanding of the impact of forestry on water use in South Africa and the consequences for development of the sector.

3.2.4 *National Land reform*

Claims for restitution of land rights are dealt with through the mechanisms of the Restitution of Land Rights Act (Act of 1993). Stipulating that people who lost a priori rights to land through racially discriminatory law shall be entitled to the restitution of land they lost or to receive appropriate compensation, this Act aims to address some of the historic imbalances in South Africa at the same time addressing issues associated with the landless. Both state land and private land have become subject to restitution claims.

3.2.5 Links, synergies and conflicts between initiatives, institutions and policies

Water is a complex natural resource decision-making around which cannot be separated from policy decisions on land affairs, forestry management, environmental affairs and importantly constitutional goals to address poverty and development. Hence, watershed management involves decision-making at a cross-sectoral level and the associated development of cross-sectoral policies. This requires the collaboration, co-ordination and combined effort of all sectors and departments that potentially impact water use and management including agriculture, development (urban and rural), housing, health, environment and public works. In South Africa the overarching public policy at a national level is the Constitution against which all other policies are assessed according the rights of the South African people. In order to manage different areas of priority within the country, national government departments then perform line functions across domains such as security, housing, energy, water and the environment. Principles, policies and statutes directly informing the domain of application underlie these line functions. The actions required to implement these policies are then carried out through local government departments responsible for service delivery and municipal bylaws (MacKay and Ashton, 2002). The following process is depicted in figure 9 below.

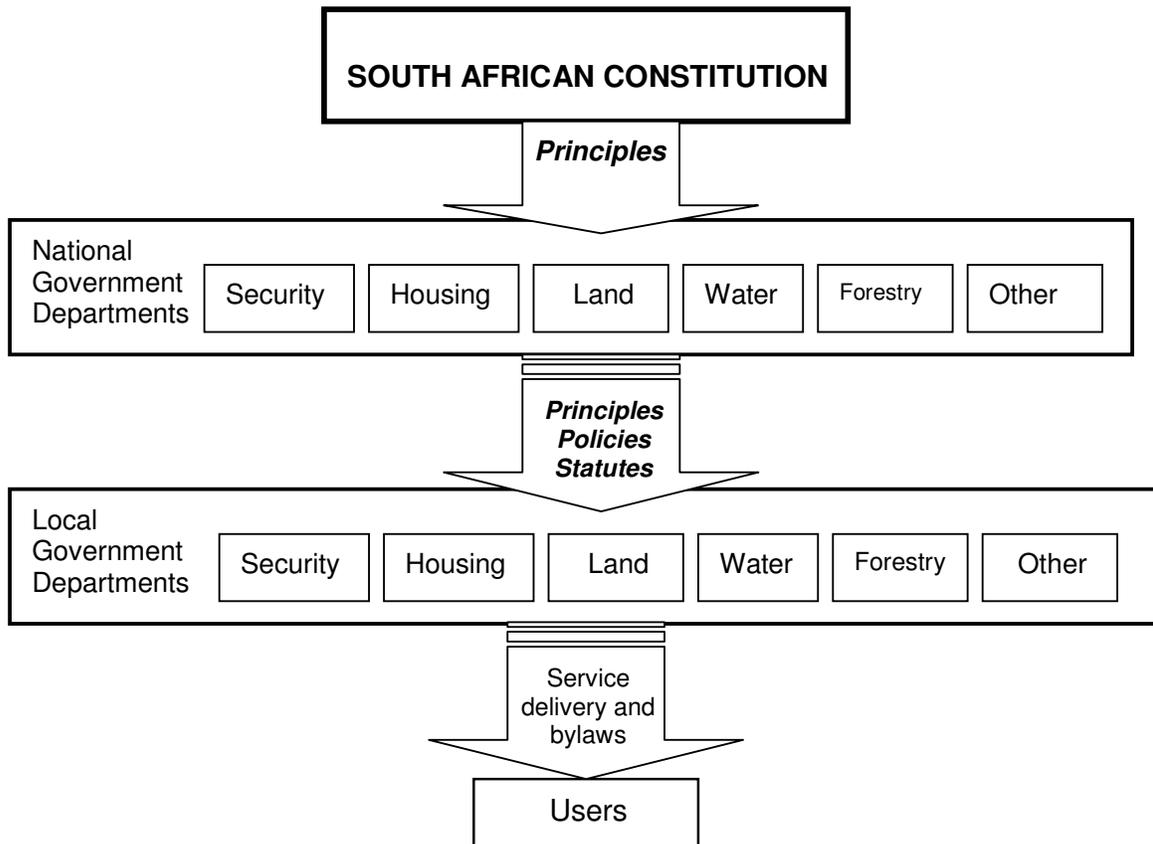


Figure 9: Hierarchy of government departments responsible for policy implementation

Source: Adapted from MacKay and Ashton, 2002

This generic framework for policy formulation and implementation is further compounded for the water sector in South Africa. As water is now regarded as a national asset which must be managed for the “benefit for all, forever”, decisions taken and carried out potentially impact a

wide range of users from anthropocentric needs, to industry and agricultural needs, to environmental needs and international agreements. Figure 10, below gives a hypothetical framework for water policy implementation across all related sectors. The most critical or foremost needs are shown at the top of the pyramid. Water for basic human needs and water for development are prioritised in South Africa as the core needs and are managed by the Department of Water Affairs and Forestry. The next level for implementation identifies critical needs for the sustainability of the resource and the support of both national international strategic agreements. These interventions focus on creating an enabling environment for water management and include water for ecosystem functioning, water for international obligations, water for the maintenance of the National Water Balance, water for strategic industrial use and finally water allocated to meet the “free basic water” quota. These interventions are also the responsibility of the department of Water Affairs and Forestry, and they are expected to be accountable for both management and implementation at this level.

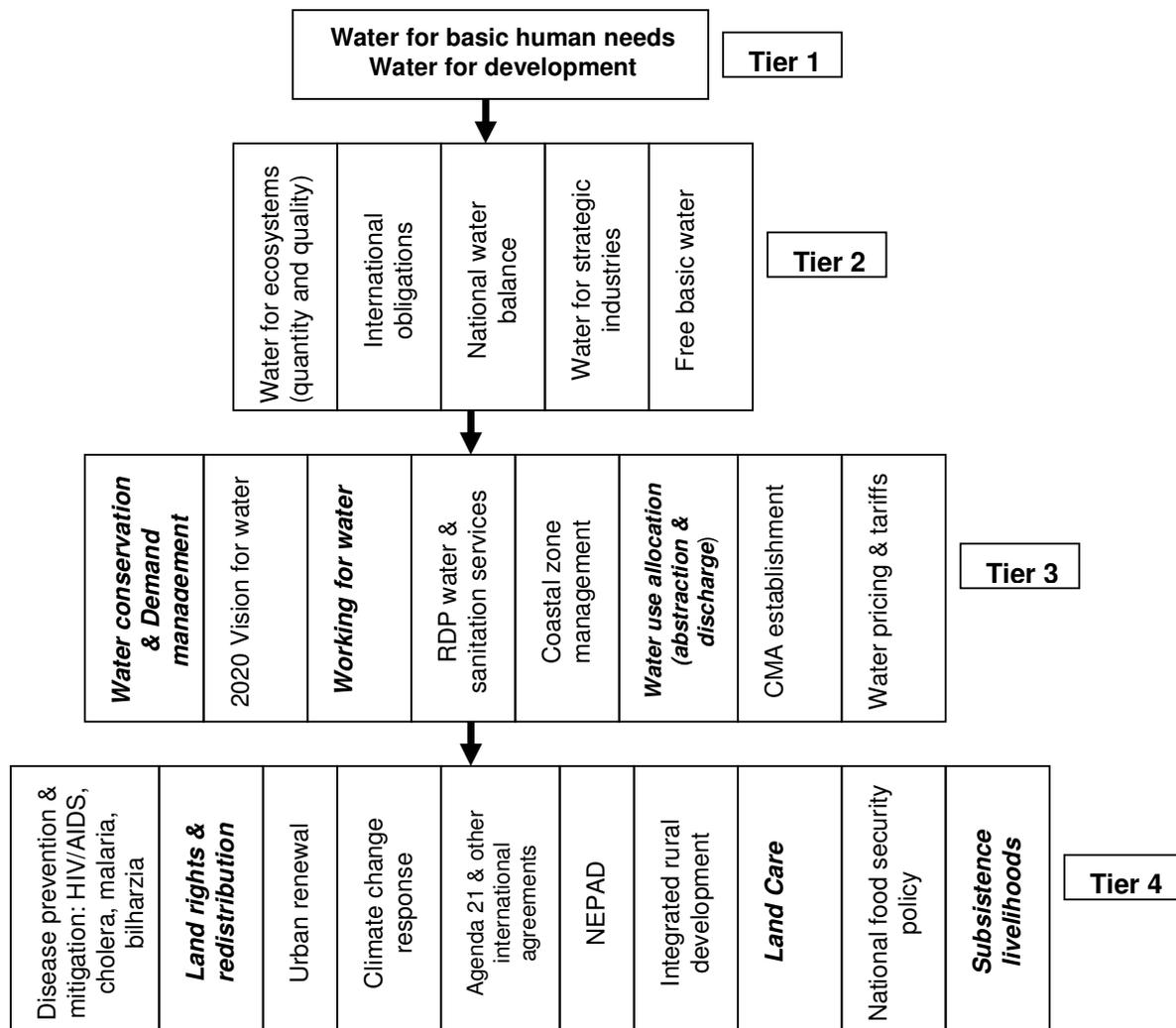


Figure 10: Hypothetical framework for water policy implementation across all related sectors

Source: Adapted from MacKay and Ashton, 2002

The third tier introduces mechanisms and programmes to manage the available water supply and includes water conservation and demand management; the 2020 vision for water;

initiatives such as the working for water programme; Reconstruction and Development Programme water and sanitation services; coastal zone management programmes, water use allocation systems and processes, CMA establishment, and water pricing and tariff structures. It is expected that these programmes will be initiated by a “lead agent” such as the DWAF but that they will be maintained in other sectors at provisional, local of water management area level (MacKay and Ashton, 2002). Within this third tier the role for “markets for watershed services” becomes practical. The mechanisms or programmes highlighted in bold indicate specific case options for implementing markets for watershed services within the broader water policy implementation framework, these specifically include water conservation and demand management, working for water and the water allocation process.

The final tier, tier four, consists of “broad national programmes that may be led by other sectors” but are significantly dependent on water for prioritisation and implementation. At this level there are “bi-directional” inter-linkages with water policy as priorities set in these national programmes may impact water policy development and alternatively water policy development may impact on the feasibility of these programmes (MacKay and Ashton, 2002). Markets for watershed services at this level are directly impacted by the national initiatives around sustainable livelihoods; land care; and land rights and redistribution.

3.2.6 Implications of the South African policy framework for watershed management

The policy changes set in motion by South Africa’s National Water Act, the Land Reform Programme and the Development Facilitation Act (1995), emphasise the role of rights to use water associated with land activities, as ownership of land no longer implies ownership of water, itself. Furthermore, extensive redistribution programmes have facilitated the transference of land to previously disadvantaged people, bringing to the fore many of the complexities that are to be addressed in this proposed research arena such as the roles of institutions in land and water management, the transfer of costs and benefits and the role of natural systems in addressing livelihood discrepancies.

The policy framework for South Africa described in the sections above, indicates that the policy environment is changing and is looking for creative solutions to addressing the national priorities around poverty alleviation, provision of resources for basic needs, job creation, development and economic and environmental sustainability. Specific areas of potential implementation and linkages for markets for watershed services within the water policy environment are highlighted in figure 10 above, these, as well as other initiatives set out in the Land Act, the Communal Land Bill and the National Environmental Management Act are all expected to support or underpin the framework set out in figure 11, below. This figure depicts the traditional livelihoods approach adapted for the adoption of watershed services and supported by the selection of appropriate market instruments. The watershed services highlighted in italics and the corresponding financial instruments are those that are currently being adopted and prioritised in the country, whether formally or informally.

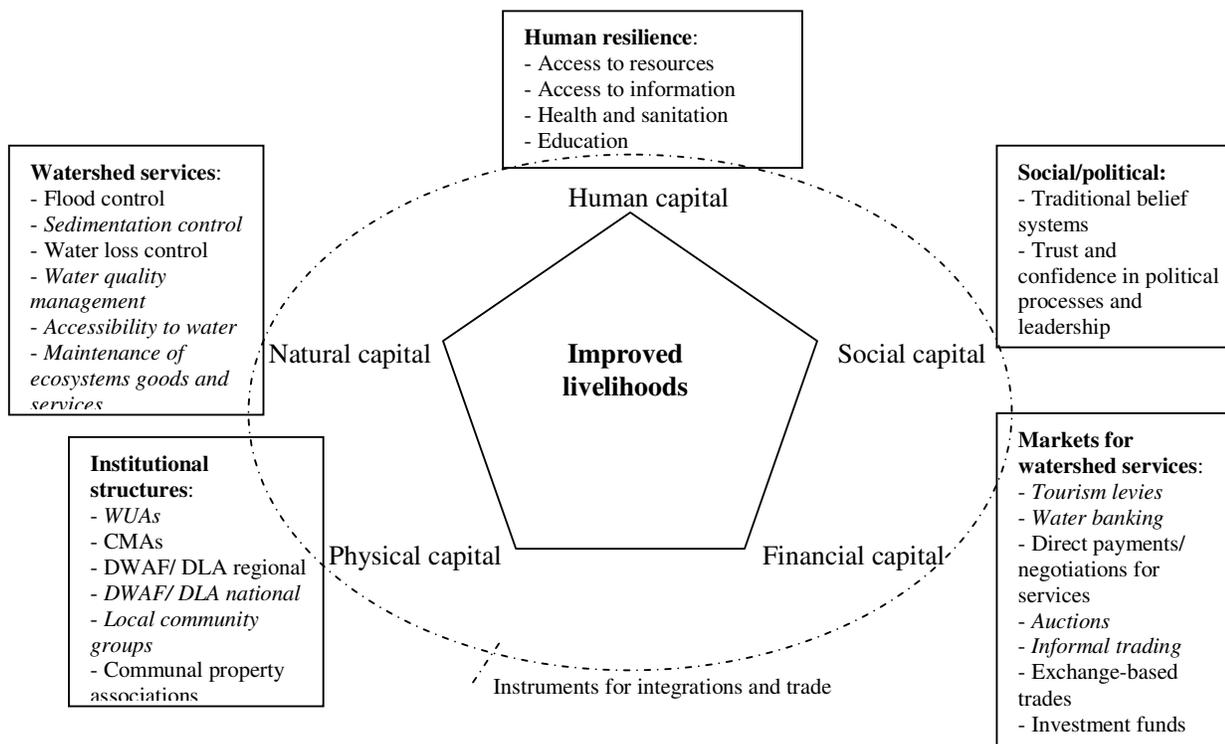


Figure 11: A livelihoods approach to markets for watershed services in South Africa

Source: Own compilation

3.3 Stakeholders in South Africa's watersheds

The main stakeholders in the watersheds in South Africa can be categorised generically as follows:

- Water service providers:
 - Water abstractors and distributors:
 - Government;
 - Catchment management agencies;
 - Water boards;
 - Water user associations.
- Water users:
 - Commercial forest managers:
 - Sappi, Mondi, GEF, and the National Government
 - Indigenous forest managers:
 - Forest owners associations
 - Commercial agriculture:
 - Private land owners/ farmers and Government
 - Subsistence agriculture:
 - Private land owners, communal land owners, community groups
 - Rural settlements;
 - Urban settlements;
 - Domestic users;
 - Secondary industry and commerce;

- Other primary industry such as mining;
- Conservation and tourism.
- Advocates of good watershed management:
 - Non-Governmental Organisations:
 - REWARD and the IUCN-SA
 - Researchers:
 - Broad categories from local universities and research institutes, to international research institutions and private companies investing in research development
 - Donor's:
 - DFID, USAID, SIDA, DANIDA, WWF, EU and GEF

More specific catchment information is available in the National Water Resources Strategy, Appendix D – Information at a water management level. To download this report visit: <http://www.dwaf.gov.za/Documents/Policies/NWRS/Default.htm>.

Table 6 outlines the above-mentioned stakeholders and identifies the desirable type of land management and watershed practices they should support along with the related incentives and disincentives to do so. The practices, incentives and disincentives highlighted in bold are ones which are currently being practised and identified in South Africa. The others introduce more broadly the 'ideal state' in terms of practices and incentives or disincentives for improving watershed management.

Table 6: Main stakeholders in watersheds and their management practices in South Africa: A generic framework

Source: Own compilation

Stakeholders in watershed management	Desirable watershed management activities	Constraints / disincentives	Incentives (current / planned / proposed)
Commercial forest managers (government agencies, private foresters, conservation agencies)	<ul style="list-style-type: none"> ▪ Management of streamflow reduction; ▪ Develop and maintain environmental friendly and sustainable harvesting practices; ▪ No planting along watershed catchment zones and riparian zones or in sponge areas. 	<ul style="list-style-type: none"> ▪ Profit-driven; ▪ Insufficient budgets; ▪ Average water efficiency returns 	<ul style="list-style-type: none"> ▪ Tax rebates for proper streamflow reduction management; ▪ Free seedlings for private planting through growers schemes aimed at improving livelihoods (CSIR programmes)
Indigenous forest managers (government, conservation agencies and private companies)	<ul style="list-style-type: none"> ▪ Develop and maintain proper indigenous forest cover through conservation and rehabilitation 	<ul style="list-style-type: none"> ▪ Insufficient budget allocations; ▪ High costs of management 	<ul style="list-style-type: none"> ▪ Potential for tax rebates for proper land-use practices; ▪ Establishment of conservancies
Commercial agriculture	<ul style="list-style-type: none"> ▪ Efficient use of water; ▪ Recycling and re-use of waste water; ▪ Effective water quality management (adherence to resource directed water resource quality management levels); ▪ Full cost water tariffs 	<ul style="list-style-type: none"> ▪ Low cost production objectives; ▪ Subsidisation by government; ▪ Low water efficiency returns; ▪ Exclusion of externalities in markets; ▪ Competition for 	<ul style="list-style-type: none"> ▪ Reduced subsidisation of the industry; ▪ Water allocations and licencing applications; ▪ Move towards full cost pricing and metering; ▪ Resource directed

Stakeholders in watershed management	Desirable watershed management activities	Constraints / disincentives	Incentives (current / planned / proposed)
		supply; <ul style="list-style-type: none"> ▪ <i>Applications for licencing and changes to historical use (removal of the grandfathering principles);</i> ▪ <i>Land reform and security of rights</i> 	water quality management; <ul style="list-style-type: none"> ▪ <i>Land reform</i>
Subsistence agriculture	<ul style="list-style-type: none"> ▪ <i>Access to water and efficient use thereof;</i> ▪ Improved water productivity; ▪ Reduced soil erosion; ▪ <i>Improved crop selection and soil rehabilitation</i> 	<ul style="list-style-type: none"> ▪ Poor access to information and education around proper agricultural and land management practices; ▪ Mainly dry land agriculture dependant; ▪ Imperative for low cost production; ▪ Land reform processes ▪ Many farmers compelled to plant short-term crops in order to meet subsistence needs rather than invest in long-term land management practices such as planting trees 	<ul style="list-style-type: none"> ▪ <i>Education around land use management practices</i> (government, NGO's and research schemes) ▪ <i>Access to subsidized seedlings and equipment;</i> ▪ <i>Land reform</i> ▪ <i>Development of grower schemes associated with large industry players (eg: sugarcane growers in the inkomati)</i>
Rural settlements	<ul style="list-style-type: none"> ▪ <i>Planting of trees near homes especially on slopes;</i> ▪ Reduced building and cultivation on steep slopes; ▪ <i>Discourage bad land management practices through education and social responsibility;</i> ▪ Implement good fire control procedures; ▪ <i>Reduce soil erosion, overgrazing and bush encroachment</i> ▪ <i>Improved access to water supply and sanitation facilities</i> ▪ Water storage for dry periods 	<ul style="list-style-type: none"> ▪ Poverty reduces access to proper land management equipment and techniques; ▪ Poor access to information; ▪ Poor access to proper sanitation facilities and water supply for basic needs, ▪ Poor waste disposal facilities; ▪ Inability to pay for services and water storage tanks; 	<ul style="list-style-type: none"> ▪ <i>DWA&F sanitation programme and water supply initiatives;</i> ▪ <i>Community education programmes;</i> ▪ <i>Access to seedlings and building materials</i>
Urban settlements	<ul style="list-style-type: none"> ▪ Efficient use of water; ▪ Implementation of water demand management principles; ▪ Education around waste management, 	<ul style="list-style-type: none"> ▪ Poor internalization of costs to society; ▪ Aim to reduce service costs and payments; ▪ Culture of subsidisation; 	<ul style="list-style-type: none"> ▪ <i>Metering</i> and full cost pricing; ▪ Resource directed water resource quality management; ▪ Education around best practices for

Stakeholders in watershed management	Desirable watershed management activities	Constraints / disincentives	Incentives (current / planned / proposed)
	implementation of recycling programmes and principles at a community and household level; <ul style="list-style-type: none"> ▪ Payment of full costs associated with environmental mismanagement 		water demand management, waste recycling, efficient water use
Water abstractors (public and private)	<ul style="list-style-type: none"> ▪ Monitor water quality and quantity; ▪ Minimise water losses; ▪ Implement full cost recovery mentality (include environmental and social costs in billing); ▪ Reduce subsidization; ▪ Implement water demand management practices 	<ul style="list-style-type: none"> ▪ Social and political constraints to increasing water tariffs; ▪ Increased costs and tariffs due to: <ul style="list-style-type: none"> - Deteriorating water quality, - Diminishing quantity through allocation and increasing demand, - Increasing service access to previously marginalized communities 	<ul style="list-style-type: none"> ▪ Water licensing; ▪ Fines associated with resource directed water quality management expectations; ▪ Potential consumer preference for users engaging in best practice; ▪ Education around best practice; ▪ Metering and communication around tariff schedules
Industry and commerce	<ul style="list-style-type: none"> ▪ Efficient water use; ▪ Waste water re-use and recycling; ▪ Best practice around water quality maintenance and management; ▪ Full cost pricing; ▪ Reduced subsidisation 	<ul style="list-style-type: none"> ▪ Cost saving mentalities; ▪ Poor incentive structures; ▪ Marginal operating with limited room for improvement; ▪ Inadequate monitoring and enforcement 	<ul style="list-style-type: none"> ▪ Metering and education around water rates scheduling; ▪ Rebates for recycling and waste water management; ▪ Adherence to resource directed water quality management goals;
Domestic users	<ul style="list-style-type: none"> ▪ Efficient use of water; ▪ Water demand management practices such as: low flow toilets and showers; re-use between house and garden; watering at low evaporation times; ▪ Education and understanding of the full social and environmental costs associated with water use; ▪ Full cost pricing; ▪ Reduced subsidisation. 	<ul style="list-style-type: none"> ▪ Low willingness to pay full; costs of water use and supply; ▪ Inability to pay full costs of water by many users; ▪ Need for subsidisation across many users; ▪ High costs associated with supply to marginalised areas; ▪ No disincentives for pollution; ▪ Limited disincentives for over-use, usually block rate pricing; ▪ Poor internalisation of demand management principles. 	<ul style="list-style-type: none"> ▪ Metering and rate schedules reward efficiency and exist but need to be clearly communicated; ▪ Education programmes by government, media, schools, government and NGO's.
Conservation and	<ul style="list-style-type: none"> ▪ Efficient use of water; 	<ul style="list-style-type: none"> ▪ Profit driven; 	<ul style="list-style-type: none"> ▪ Metering and rate

Stakeholders in watershed management	Desirable watershed management activities	Constraints / disincentives	Incentives (current / planned / proposed)
tourism (government and private)	<ul style="list-style-type: none"> ▪ <i>Water demand management practices such as: low flow toilets and showers;</i> ▪ <i>Education and understanding of the full social and environmental costs of water use to visitors;</i> ▪ Full cost pricing; ▪ <i>Water recycling and re-use where possible;</i> ▪ <i>Avoidance of use of toxic soaps and chemicals.</i> 	<ul style="list-style-type: none"> ▪ Poor awareness amongst tourists around water demand management practices; ▪ Culture of over-use amongst tourists. 	schedules reward efficiency and exist but need to be clearly communicated; <ul style="list-style-type: none"> ▪ <i>Education programmes by government, media, schools, government and NGO's.</i>

3.4 Links between land-use and water in South Africa

“South Africa's available freshwater resources are already almost fully-utilised and under stress. At the projected population growth and economic development rates, it is unlikely that the projected demand on water resources in South Africa will be sustainable. Water, will increasingly becoming the limiting resource in South Africa, and supply will become a major restriction to the future socio-economic development of the country, in terms of both the amount of water available and the quality of what is available. At present many water resources are polluted by industrial effluents, domestic and commercial sewage, acid mine drainage, agricultural runoff and litter” (DEAT, 2001).

The links between land-use, water and improved livelihoods in South Africa are particularly complex indicted by the following reasons:

- Land ownership and rights to use water are separate,
- The country is regarded as “relatively dry” exacerbating the problem of water scarcity in many regions in the country,
- Accessibility to water infrastructure and the provision of water services is highly skewed within both urban and rural regions as well as between rural users and certain community groups,
- Many parts of the country are reliant on water imports from other regions and other countries, separating the providers of watershed services across catchment boundaries as well as international boundaries,
- Water use by communities is often negligible when reviewed in the context of the broader national water use,
- Complexities arise when you consider distinctions between Blue water (water in rivers) and Green water (water that is absorbed through the process of evapotranspiration). Indications are that activities that support the development of blue water tend to reduce the availability of green water. Small-scale subsistence agriculture is perceived to enhance blue water availability but in turn impacts on water quality. Changing land use practices in these communities may potentially improve water quality through erosion control but may also then reduce blue water availability and improve green water (source: discussions with

the CAMP project and implications experienced in understanding the impacts of land-use change on water supply and availability),

- Values attached to water use and hence the incentives for trade are highly variable across the country and between user groups,
- Certain land-use activities are regarded as stream flow reduction activities and are discouraged or require strict water use licencing,
- The country reflects a 'dual economy' dependent on natural resources that are not always reflected in the income statements of the country, compounded by high unemployment levels, high levels of poverty and poor access by many users to these natural resources,

Many of the important land uses, such as agriculture, forestry and fishing, mining, manufacturing/ industry, electricity and water, construction and services have water use figures that are reflected in the National Departments hydrological information database. However, water use related to rural land practices and informal economic activities are not clearly defined at a broader level, but are available where site-specific studies have been conducted. Much of the hydrological information and the water use figures for South Africa has been outlined in section 3 of this diagnostic.

Interestingly, there is a dearth of information on local beliefs and customs around water and land-use practices in South Africa. However, the role of customary law has been clearly recognised for land ownership in rural communities where communal land is governed by the community Chief and distributed according to his discretion. A recently passed 'Communal land rights bill' places the legal representation of communal land in the hands of the local Chief rather than returning the ownership of land to the broader community. This has numerous implications for the security of land tenure and choice of land practice. Where land redistribution projects have been identified, Communal Property Associations (CPAs) have been established, in order to try and address the issues associated with security of tenure. These CPAs serve as the legal persona acting as a trustee to the land and the land is allocated to this trustee, who then distributes it to the membership, similar to the administration of a trust.

The role of water and associated beliefs linked to land-use practices is identified as an information gap in the development of this diagnostic and may be considered as an area for specific focus at a later stage.

Other key concerns for the design of instruments that link land and water users:

A number of key issues need to be considered when designing market instruments that link land managers to water users. Examples of outstanding questions include:

- How to set water user charges? Should charges be differentiated to reflect differing extents of water scarcity?
- How to ensure payments for improved land management, if they are introduced, does not create perverse incentives (e.g. for landowners to engage in poor land management as a basis for claiming payments for improvements)?
- How to reconcile the fact that land managers (foresters) are both water users and watershed service providers? Should they pay a charge and also receive payments? What about a system of rebates?
- Equity issues – who is paying the charges and receiving the payments? Is this consistent with broader goals of reducing inequality?

- Political constraints – the potential for conflicts between the Department for Land Affairs and the Department for Water Affairs and Forestry (DWAF). These agencies may resist full integration. Also, there may be constraints to integrated catchment management within DWAF.
- Institutional capacity – Catchment Management Agencies will take up to 20 years to be established. Will they have the capacity to act as intermediaries if markets for watershed services and improved livelihoods are established?
- International obligations – will the payment system work across international boundaries? For instance, South Africa supplies water to Swaziland and Mozambique and receives water from Lesotho.

4 Relevant watershed services in South Africa

In order to gain a better understanding of what watershed services were evident in South Africa, which ones were critical in the context of water management under the National Water Act and the feasibility of developing research initiatives around these watershed services, a workshop was held with the project learning group, a core group of water specialists in the country. This section includes the outputs of the workshop and the associated prioritisation table based on the votes of the workshop representatives. The agenda and participants list for the workshop are given in appendix 1 and appendix 3 respectively.

Critical watershed protection services for South Africa were identified, with specific focus on the role of water management under the National Water Act and the implementation of the National Water Resources Strategy. The identified services have been grouped into key strategic areas and prioritised based on 1) the level of critical importance to South Africa's water sector and watershed management and 2) the potential to carry out research and pilot studies around these services in South Africa. They are the following:

4.1 Water quality

- Water purification;
- Health protection and management relating to water-borne diseases;
- Water salinity control and reduction;
- Control of sedimentation;
- Reservoir siltation and infrastructure protection and management;
- Rural water purification and accessibility.

4.2 Ecosystem goods and services maintenance

- Species and biodiversity conservation;
- Wetland rehabilitation;
- Protection of the ecological reserve;
- Natural resource class (for this study water quality classes);
- River rehabilitation (maintenance of the riparian zone).

4.3 Accessibility to water resources

- Security of supply;
- Flow assurance (minimizing variability in security of supply);
- Access to water use “entitlements” for schedule 1 and licensed users;
- “Rights” management for basic human needs and the ecological reserves;

- Supply assurance for economic activities (for example, agriculture);
- Water table management in terms of depth and re-charge rates of groundwater.

4.4 Stream flow and assurance of supply

- Assessment of stream flow reduction activities and maintenance of stream flow;
- The removal of alien plants on river banks affecting stream flow rates downstream, for example the DWA&F working for water programme.

4.5 Capacity building across users and communication of key issues to stakeholders

- Deepening of democratic culture;
- Inclusivity and representivity in all capacity building processes.

4.6 Property rights

- The role of water rights, licensing and trade, including linkages to land rights;
- The management of common property resources (CPR) and opportunities for improved livelihoods.

Water quality; ecosystem functioning and goods and services; accessibility to water resources; and stream flow regulation and assurance of supply were identified as the most relevant watershed protection services for South Africa. While capacity building, information sharing and transfer and a clearer understanding of property rights, licensing and trade were identified as areas that require research investment within the framework for watershed protection services. After prioritisation it emerged that accessibility to water has the highest weight in South Africa, followed by water quality regulation, capacity building, and stream flow regulation in terms of importance to watershed management. However, the weighting changed when these issues were measured against the feasibility of implementing projects focused on markets-based mechanisms and these services. Based on this criterion, water quality regulation emerged as the most feasible watershed service around which to implement pilot projects, followed by stream flow regulation and assurance of supply, and ecosystem functioning and goods and services. Capacity building also emerged as a strong requirement for implementation.

Based on these weightings an aggregate weight was assigned to the different services and water quality; followed by stream flow regulation were identified as the services with the most critical needs and the greatest possibility for pilot project implementation. Capacity building needs were also identified as high priority. The final ranking used the feasibility ranking as the initial point of departure and then weighted this along with the critical resource management rank, to get a final proposed but not prescriptive prioritisation. The ranks and weightings based on two votes per person attending the workshop are shown in table 7, below.

Table 7: Watershed services prioritisation based on individual votes

Source: Own compilation

Watershed services	Prioritisation		Rank Based on feasibility
	Critical to resource management	Feasible to implement research initiatives	
Water quality	2	1	1
Ecosystem goods and services	5	3	5
Accessibility to water resources	1	4	4
Stream flow and assurance of supply	4	2	3
<i>Capacity building and information transfer</i> ³	3	1	2
<i>Property rights defined and understood</i> ⁴	5	4	6

5. Land use practices and management regimes within watersheds

Some of the most important water users in South Africa are also land managers. The agriculture sector alone accounts for about 60 percent of total water use. The forestry sector is also critical, accounting for an estimated 8 percent of available water. In addition to using significant volumes of water, land managers have impacts on water quality. Under the previous apartheid regime, apart from the introduction of controls on afforestation in 1972, the links between water use and land management were rarely considered in planning water service delivery. Water resource management has also been particularly inadequate in the former Homeland areas, however, the South African government has set in motion a number of programmes aimed specifically at addressing these imbalances through the provision of water supply for basic needs and sanitation facilities. Table 8, outlines the nineteen water management areas in South Africa and the generic structure of land-use, water-linked activities that take place in each of these areas.

Table 8: Land use practices in the different water management areas in South Africa

Source: Own compilation

Data Source: CSIR- GIS

Water management area	Size in km ²	Land use practices
Limpopo	60385.97	Domestic water use, Irrigation agriculture, Wildlife conservation
Luvuvhu and Letaba	25016.12	Domestic water use (Urban and rural), Irrigation agriculture, Wildlife conservation
Crocodile (west) and Marico	47520.45	Domestic water use Agriculture, Industrial water use, Mining, Forestry
Olifants	54564.63	Domestic water use Agriculture,

³ Not really a watershed service but rather linked to market principles (transaction costs and perfect information)

⁴ Not really a watershed service but linked to market principles relating to defined property rights

Water management area	Size in km ²	Land use practices
		Mining, Wildlife conservation
Inkomati	28670.89	Domestic water use, Livestock and game farming, Irrigation agriculture, Afforestation, Industrial water use
Usutu to Mhlatuze	45056.76	Domestic water use Irrigation agriculture (sugarcane) Dryland and subsistence agriculture Commercial forestry Indigenous forests
Thukela	29035.22	Domestic water use Thicket and bushland (much degraded) Dryland and subsistence agriculture Some irrigation agriculture (sugarcane and other)
Upper Vaal	55523.49	Domestic water use Commercial dryland Commercial irrigated Improved grassland Urban settlements Mining
Middle Vaal	52551.11	Domestic water use Commercial dryland Mining Urban settlements
Lower Vaal	133747.99	Domestic water use Semi-commercial subsistence dryland Commercial dryland farming Thicket and bushland (conservation) Urban centres
Mvoti to Umzimkulu	27185.02	Domestic water use (Urban and rural) Afforestation, Irrigation agriculture, Dryland sugar cane, Industrial and commercial water use
Mzimvubu to Keiskamma	66193.52	Domestic water use (Urban and rural) Afforestation, Irrigation agriculture, Dryland sugar cane, Industrial and commercial water use
Upper Orange	94018.80	Domestic water use Commercial dryland agriculture Mines and quarries
Lower Orange	260844.17	Domestic water use Shrubland and low fynbos (conservation and tourism)
Fish to Tsitsikamma	96950.76	Domestic water use Irrigation agriculture Commercial forestry Conservation and tourism
Gouritz	52950.27	Domestic water use Indigenous forest (Tourism and conservation)

Water management area	Size in km ²	Land use practices
		Commercial forestry Irrigation agriculture (small) Urban development
Olifants.Doorn	56747.83	Domestic water use Commercial irrigated Commercial dryland
Breede	19662.69	Domestic water use (urban and rural) Agriculture (wine and fruit production), Forestry
Berg	13296.54	Domestic water use Urban development Conservation and tourism Irrigated agriculture (wine and fruit production)

5.1 Linking land managers to water users

Catchment Management Agencies are likely to play a key role as intermediaries between land managers and water users in South Africa. As such the government has set out its plans to introduce a *Water Resource Management Charge* to be collected from water users (including farmers and plantation owners) to finance the activities of CMA's. This charge will be additional to a water development charge used to finance infrastructure and waterworks development and operation as well as an economic charge to reflect social and economic externalities imposed by water use. However, at this stage the structure of the use of these funds to support such initiatives has not been established and the extent to which they may be used to provide "payments" for preferred land management practices by private landowners is unclear.

Another market mechanism being considered, that may help ensure land managers internalise their offsite water impacts is that of *water license trading*. However, this process is still highly dependent on the registration and issuing of effective licences. The monitoring and management institutions for such trading are at this stage limited. Currently, *independently negotiated "deals"* do occur between like users such as irrigation agriculture. This is specifically for the transfer of water for specified periods of time and is not formally recognised in the water law, although the DWA&F is fully aware of such trading. Another interesting approach to independently negotiated deals is evident in the Mpumalanga/Northern Province. Here a model is provided where a private nature reserve in the Sabie-Sand catchment negotiated a payment for improved land management upstream of its reserve following severe droughts in the early 1990s that killed off thousands of its wildlife. The payment was couched in a multi-faceted "Save the Sand" project undertaken in partnership with DWA&F and the Working for Water programme. Further potential pilot links are discussed in greater details in section 8.

5.2 Threats to watersheds and management responses

Watershed management institutions ranging from high level government bodies through to community groups have to a large extent a good understanding of the types of behaviour and management practices that are detrimental to watershed functioning. Threatening the supply and quality of watershed services and more importantly the water resource itself. As such

their management actions are largely focussed on eradicating, controlling and modifying these practices. Issues of concern are the following:

- Bush encroachment of indigenous forests for forest products;
- Overgrazing and soil erosion especially evident on communal land both upstream and downstream of some of the large catchments in South Africa;
- Subsistence farming practices that also facilitate soil erosion and river sedimentation;
- Poor access to sanitation facilities in many rural areas leading to changes in nutrient levels in watersheds and increased incidence of diseases such as cholera;
- Increased application of fertilisers in agriculture leading to increased incidence of water pollution;
- Planting along riparian zones and the detrimental effect of the arrival of water dependant alien invasives.

5.3 Factors that constrain improved watershed management and the implementation of policies and legislation

Despite the success evident in programmes such as the working for water programme, the rivers health programme, the sanitation and water supply development initiatives to rural areas and the goals of the National Water Act (Act No 36 of 1998), improving watershed management is constrained by a number of policy, institutional and social factors as follows:

5.3.1 Constraints to government agencies addressing watershed protection services

- The DWA&F is faced with the unenviable task of implementing an extremely inclusive and progressive piece of legislation which is time consuming and expensive. As such, currently budgets for the monitoring and protection of watershed services are limited;
- Catchment management agencies are still in the phase of being institutionalised and as such do not currently have the capacity to implement land management practices such as those required for watershed protection services, let alone the budget support to do so;
- Currently licence renewal and application processes are underway, until this is complete the DWA&F will not have complete knowledge of who all the users of and what their demand are on the water resources of the country.

5.3.2 Constraints to changing the behaviour of stakeholders

- Currently, extensive land reform processes are underway, however many people still do not have title to land and in many places where there is land titleship it is to communal land, as such property rights are poorly defined and there are few incentives for improved soil conservation practices, waste management practices and improved sanitation;
- A large sector of the population faces poverty on a daily basis and activities are directed towards short-term survival rather than long-term sustainability;
- Historical agricultural policies such as heavy subsidisation of water and process inputs have encouraged poor watershed management practices;
- Externalities of watershed use and the roles of users along the watershed are still not clearly defined, let alone well communicated, as such many people continue to be unaware of the impacts of their behaviour on other users;

- Due to the rapid developments in the water law and the current context of implementation there exists uncertainty around the security of many users to their future access to water resources hence a certain level of resistance to change;
- Numerous community stakeholder meetings have been held and education programmes implemented, however, actual change on the ground level is constrained to various external drivers and many communities have become disillusioned with the processes.

5.3.3 Constraints to implementing cost recovery measures as supported in the National Water Act

- Many users have not internalised their understanding of water as a scarce resource and hence are not supportive of the requests to pay for water and to face the costs of higher water tariffs, along with catchment management agency charges and water resource quality charges;
- Water supply agencies are faced with the increasing costs of water supply development, infrastructure maintenance, and water losses;
- Uncertainty as to the portion of watershed management service charges actually being used to support the services and not high administrative costs also exists.

5.4 Progress and opportunities for improved watershed management and the implementation of policies and legislation

In spite of the above-mentioned constraints South Africa has made valuable progress thus far, much of which can be capitalised on for the development of markets for watershed protection services and improved livelihoods. The role of economic incentives and pricing have been explicitly introduced in the National Water Act, a few examples of encouraging incentives are discussed below:

- Water for basic needs has been provided free of charge in a move to address improved livelihoods;
- Initiatives to find ways of making water more productive and accessible for subsistence farmers are underway;
- Sanitation is being supplied to many communities without access to it;
- Water conservation initiatives are built into the NWA in the setting aside of the reserve;
- Water quality management needs are being established through the water resources strategy by using water quality resource directed measures.

Stakeholder participation is openly encouraged in all water-management planning decisions through:

- Progressive consultative policy processes;
- The establishment of numerous community representative groups, forest user associations, CMA's, and others, providing opportunities for stakeholder inputs;
- Development of partnerships with NGO's and government initiatives such as AWARD and the Working for Water Programme.

6. Key opportunities and constraints for developing markets for watershed protection services in South Africa

The following opportunities and constraints were identified for developing markets for watershed protection services in South Africa by the project learning group. Many of these are generic and can potentially be unpacked further but for the purposes of this diagnostic, capture the key issues.

6.1 Opportunities for developing markets for watershed protection services in South Africa

6.1.1 Inequalities

- Current inequities based on historical structures prevent many people from having access to and participating in value addition activities based on natural resources. Market-based instruments provide opportunities to incorporate all parties into the trade-offs when accessing environmental goods and services and in particular watershed services;
- Similar to inequities listed above, local disparities between users of natural resources (watershed services) provide a framework in which opportunities exist around win-win trade-offs.

6.1.2 Availability of information and data

- Many catchments have been well researched and there exists good data and good expert opinion on watersheds;

6.1.3 Desire to address livelihoods improvement

- A particular goal of the South African constitution and many of the related Act's is the improvement of quality of life through poverty reduction. Market-based instruments have the potential to set up systems that result in payments flowing directly to the poor and thereby addressing quality of life;
- The working for water programme serves as a very good example of a system that is already established providing watershed services.

6.1.4 Catchment management agencies

- The process behind the rollout of catchment management agencies raises questions around how to address all users needs while at the same time meeting financial obligations and uplifting livelihoods. This introduces opportunities for:
 - Market-based instruments within catchment management agencies,
 - The influence of the design of catchment management agencies;
- The new water legislation places much emphasis on user charges, how these will be reflected and determined still needs to be decided and market-based instruments can potentially support these decisions;
- CMAs must effectively operate as the intermediaries as the NWA empowers them to collect water use charges for almost all watershed services.

6.1.5 Institutional and policy change

- The National Water Act (1998) provides an avenue for incorporating market-based mechanisms into the legal framework;
- Opportunities exist as the revision of many national policies is taking place.

6.2 Constraints for developing markets for watershed protection services in South Africa

6.2.1 Institutional constraints

- Catchment management agencies are still in their infancy and are predicted to take between five and twenty years before they are fully established. If they are expected to act as the intermediaries in market-based systems for watershed services it may be unreasonable to expect direct implementation in the near future. Hence, currently it may be more rewarding to investigate systems that already exist with the potential to engage in direct transfers;
- Water scarcity constraints as a direct result of institutional capacity (or failure), referred to as 2nd order resource scarcity.
- Water user charges for water quality protection are still under development. It may take some time for these to be developed and implemented.
- Water Resource Management Charges were introduced August 2002 – backdated to April – These charges are intended to support water resource management (i.e. watershed services)

6.2.2 Capacity and desire to change

- There exists a need to facilitate inertia around change within water resources licensing and stakeholder perspectives. Currently incentives do not exist that encourage those with access, historical rights and capacity to put water to productive use to ‘give to’ or ‘support’ those who do not have access, historical rights and capacity;
- A culture and desire to change needs to be encouraged but at a pace that can be supported and adopted. Questions remain as to “how consensus on this issue of change is achieved?”
- Consensus building is further complicated by the diversity of stakeholders within watersheds participating in decision-making.
- Existing water users are already required to pay for water quantity charges (if part of a Government Water Scheme) and a Water Resources Management Charge – with pollution levies in the pipeline – they will not take kindly to other “watershed services charges”

6.2.3 Valuation

- There is little or no understanding of the values attached to commodities and services within watersheds;
- Discrepancies may exist between demanders’ willingness to pay and ability to pay;
- However, the current water legislation is in place and makes provision for the adoption of economic instruments and pricing for example through the adoption of efficiently and equitably determined user charges, the levels of these charges is still under discussion.

6.2.4 Capacity building

- There is still a large emphasis on food production and agricultural development by many poor, stakeholder consensus around meeting basic livelihood needs is still to be established;
- Education and stakeholder awareness is limited;
- The potential for water “fights” and the implications of decisions are not currently well understood by users.

6.2.5 Inequalities

- Inequalities are evident in terms of peoples’ access to water;
- There exists the need to ensure equitable allocation of and accessibility to water resources.

6.2.6 Knowledge transfer

- Information and understanding of the full implications of markets and the external effects of trade decisions are still not fully understood.

6.2.7 Institutional and policy change

- There is a perception of a lack of consensus among policy makers and researchers.

6.3 Broader discussion on the gains and losses of adopting certain approaches to address watershed management

“Interest here, in a southern African context is that the loss, transformation and/or reduction in ecosystem services appears to be closely associated with rural poverty induced by past land-use practices. These practices seem to have ignored the dependence of rural living on ecosystem services and the consequences of ecosystem erosion for atmospheric and climatic stability. An increasing interest in the ability of humans to harness science and technology to reverse ecosystem degradation is providing special opportunities to restore ecosystem functions and services. This has the potential of alleviating rural poverty through the orderly marketing of some of these services”, (De Wit and Blignaut, in press).

6.3.1 Gains of adopting certain watershed management approaches

- Costs of water supply management are decreased,
- Costs of water supply losses are decreased as water is protected and saved in other areas/ regions,
- Previously “unavailable” or “inaccessible” water is made available for productive subsistence agriculture,
- Impacts and threats to the maintenance of the reserve will be diminished as water supply, quality and aquatic habitat are maintained,
- Broadly inclusive stakeholder participation in decision-making that encourages the trade-offs associated with different approaches and affecting different groups to be internalised,
- Monopoly power-bases are discouraged,
- Improved quality of life for community groups that were previously marginalized or had diminished power-bases when negotiating for access to productive water and watershed services,
- Improved information transfer and reduced transaction costs around watershed management and best practice, market development, and market transactions,

- The establishment of an intermediary to facilitate transfer payments and the protection of watershed services that is accountable and sustainable,
- The value of watershed services is understood and clearly communicated,
- Watershed services are maintained and protected,
- Food security risks are reduced as water supply is maintained and made accessible to subsistence users,
- Allows for the assessment of water quality

6.3.2 Risks of adopting certain watershed management approaches

- Costs of water supply management, infrastructure development and maintenance are increased as systems to support payment mechanisms are developed,
- Users of water and watershed services may feel that the proposed catchment management charge should be used to cover the costs associated the management of watershed services, hence there may be an unwillingness to pay “again”,
- Where accessibility to watershed services or the ability to participate in the provision thereof is poor or not clearly established, there may be potential for existing power-bases to monopolise the market and further exacerbate inequality and poor livelihoods,
- Prioritisation of certain watershed services and the market-based mechanisms associated with them at the expense of losing other potential opportunities,

- Exacerbated poverty and poor livelihoods where stakeholder participation is not inclusive, where monopoly power over certain services is supported, and where inaccessibility is perpetuated,
- Potential for corruption and mismanaged where the intermediary becomes powerful and clear administrative monitoring and evaluation guidelines are not established,
- Watershed services are under or over valued and discrepancies between willingness and ability to pay are evident.

Table 9 further outlines the gains and losses potentially associated with some of the projects identified in section 8 below.

Table 9: Project related gains and risks associated with the adoption of watershed protections market-based mechanisms in South Africa

RSA Project	Region	Watershed services	Proposed commodity(s) mechanism	Potential gains	Potential risks
KwaZulu Natal Parksboard	St Lucia, KwaZulu Natal	Water supply control / flow regulation	Watershed protection/ best management practices, Water rights acquisition, Resource use charges, Stream flow reduction licences, Land acquisition	Maintenance of the world heritage site, Improved water inflows,	Closure of the estuary mouth, Reduction to upstream developments and activities,
KwaZulu Natal Parksboard	St Lucia, KwaZulu Natal	Erosion and sedimentation control	Best land management practices, Direct payments/ charges to boat launchers	Reduced sedimentation control costs (dredging), Maintenance of the estuary mouth and the recruitment of marine species to the lake, Improved recreational facilities, Community access to payments and improved livelihoods	Closure of the estuary mouth, Unwillingness by demanders to pay for the service, Poor information around best practice and lack of community education,

RSA Project	Region	Watershed services	Proposed commodity(s) mechanism	Potential gains	Potential risks
Wetland encroachment management	Klip River Catchment	Water quality control	Direct payments to suppliers by demanders	Improved water quality of return flows, Opportunities for recreational development, Maintenance of ecosystem integrity, Community benefits through payments	Water quality control under/over valued, Access by communities and ability to participate in the provision of the service diminished or abused, Unwillingness by downstream users to pay for the service
ARISE	National / Sand River	Aquatic habitat protection	Best wetland management practices, Land acquisition / lease	Maintenance of ecosystem integrity, Protected wetland and water quality service provision, Knowledge transfer to the community	Community access to wetland denied/limited, Lack of education and knowledge transfer, Poor institutional capacity to administer funds
		Erosion and sedimentation control	Rehabilitation of land through forestry and the maintenance of forest products	Maintenance of ecosystems and best land management practices through revegetation and education, Community development and improved livelihoods through access to sustainable resource use, Market-based instruments are encouraged and supported	Hydrological impacts are potentially high, The full economic, social and environmental impacts are not well known, Markets reliant on an intermediary.
Department of Land Affairs (DLA) Land Care Project	National	Erosion and sedimentation control	Rehabilitation of land through revegetation and other biological controls	Maintenance of ecosystems and best land management practices through revegetation and education, Community development and	Hydrological impacts are potentially high, The full economic, social and environmental impacts are not well known,

RSA Project	Region	Watershed services	Proposed commodity(s) mechanism	Potential gains	Potential risks
				improved livelihoods through access to sustainable resource use.	Markets are not clearly established and information is poor, Risk that without the supervision of the DLA degradation may become evident again.
The Phalaborwa waterboard	Northern Province – Steelpoort valley	Erosion and sedimentation control	Best land management practices, Improved erosion control practices, Direct payments for services to suppliers by demanders.	Community education, Transfer payments to communities that create income flows and improved livelihoods, Maintenance of water storage space in the barrage, Protection of downstream ecology, Clearly defined market and services established, No direct need for an intermediary	Ecological damage to the Kruger National Park, Water supply losses, Unwillingness by park visitors to pay for upstream watershed services, Potential for corruption and misuse of funds.
Working for water programme	National	Water supply and water quality control	Removal of water intensive alien invasive species and direct payments to do so	Transfer payments for the provision of services and direct job creation, Market already established and functioning well, Good information transfer, Reduced impact on hydrology and improved water flows.	Project unsustainable without current government support funding, Market dependent on government institutional and administrative support.

RSA Project	Region	Watershed services	Proposed commodity(s) mechanism	Potential gains	Potential risks
		Maintenance of aquatic habitat	Direct payments	Suppliers and demanders get to trade directly, Value of the service is negotiated and understood, Willingness to engage in a market is accepted upfront, Transfers go directly to the suppliers improving job creation and livelihoods.	The value of the service is not known or agreed upon, Demanders of the service are unwilling to pay for the service as they may want it to be included in the proposed catchment management charges, Transaction costs may hinder the establishment of an effective market.
Making forest markets work for the poor	Eastern Cape	Erosion and sedimentation reduction	Market transfers for forest products, Best management practice for erosion reduction	Suppliers and demanders of the service are identified, There is existing demand for the establishment of markets, These markets aim specifically at the improved quality of life of rural poor, Best land management practices are supported and encouraged.	Increase in stream flow reduction activities impacting water supply, Value of services may not be understood or communicated well, Demand for forest products and hence the market establishment may be temporary or dependent on the establishment of a good intermediary.
Laughing waters river rehabilitation programme	National	Maintenance of aquatic habitats	Water resource charges for beneficiaries or services, Catchment management charges	Protection of the riparian zone, ecosystem functioning and water flow supply, System of payments for services is established, Property rights are clearly established	There is an unwillingness or inability by demanders to pay for the service,

RSA Project	Region	Watershed services	Proposed commodity(s) mechanism	Potential gains	Potential risks
		Water supply control / flow regulation	Water licencing, Water resource charges,	Protection of water supply, Defined property rights for the user, Potential for trading and the establishment of markets,	Requires good institutional support and good scientific information on the quantities available for trading, Threat of instability where water is re-allocated between users, unwillingness to participate, Inability by poor communities dependent on dryland agriculture and subsistence living to participate
CAMP project	Northern Province – Luvuvhu	Water supply control / flow regulation	Stream flow reduction licences, Payments for watershed services	Improved access to water by community groups for improved livelihoods, Development of new mechanisms to regulate water	Ability and leverage by communities to participate in markets may be weak, Institutional support necessary
DWAF WQRDM's	National	Water quality protection	Water resource directed measures, Water licences, Markets for water quality credits.	A clear understanding of the impacts of water quality on water productivity and the importance of protecting the resource, Improved water quality, Improved scientific understanding of land-water linked impacts	Poor leverage by community groups (the poor) to engage in the market, Good institutional support may not be evident at this stage for markets and the trading of water quality credits, Uncertainty around the levels of quality and the associated credits

Source: Own compilation

7. Identification of needs, directions and drivers for developing markets for watershed protection services in South Africa

Based on the broad review of policy, opportunities and constraints around developing markets and market-based instruments for watershed protection services in South Africa, the following emerging drivers were evident:

- The National Water Act and its recognition of the role of economic instruments and pricing in water resources management;
- Decentralisation of water management sector;
- Willingness of water users to engage in trade at various levels for example the trading of water between irrigation agriculture users along the Orange and the Breede rivers;
- The establishment of institutions such as the Working for Water programme and other NGO or community based initiatives;
- Implementation of the water act and needs around informing trade-offs and the optimal levels if licensing, pricing and allocations.

Other specific needs for the development of markets for watershed protection services exist as follows:

- Clarification and ‘unpacking’ of the type of watershed-friendly behaviour that should be encouraged;
- Clarity around defined stakeholder roles and their associated impacts, communication and awareness of these roles;
- Communication of governments intentions with the aim of reducing uncertainty around stakeholder security;
- Support of initiatives and the need to continue to bring stakeholders together to address needs and fears;
- Consolidation of scattered pilot work;
- Development of standards and codes of practice for watershed management services that are aligned with the National Water Act, the water resource quality directed measures, rivers health indicators and livelihood improvement policy goals;
- The establishment of sustainable funding flows consistent with a broad valuation (or at least understanding) of watershed services

8. Incentive possibilities and pilot projects to explore for South Africa

Various projects and current initiatives were identified as potential projects to which the “Markets for watershed protection services” pilots could be linked. They are the following:

8.1 Lake St Lucia

Lake St Lucia is situated on the northern coast of Kwazulu Natal and is regarded as one of the largest lakes in Africa. Categorized as a World Heritage Site it draws many visitors on an annual basis. However, developments within the catchment in which it is situated have led to a reduction in the lake levels mainly through reduced freshwater inflow. Lower Lake levels encourage closure of the estuary mouth. The managing Parks board currently carries the high costs of dredging the estuary mouth lake in order to maintain open mouth conditions which improves recruitment of marine species to the lake, and allows offshore recreational

fishermen to launch boats in the estuary. Higher lake levels would reduce the dredging effort by creating a nett outflow of water from the lake to the sea – There is consequently potential for using water resource user charges and charges for boat launching to pay for dredging

Box 1: Lake St Lucia users

The upward pressure on water use by the following activities is expected to impact the health of the Lake St Lucia ecosystem, thereby necessitating a need to manage water use and watershed services (Weston *et al*, 1995). Demanders of watershed services in the catchment are the following:

- urban and industrial users,
- irrigation agriculture farmers,
- commercial and indigenous forestry managers,
- recreational users.

8.2 The Klip River Catchment (south of the Vaal)

Within this catchment there is evidence of encroachment by rapidly expanding townships into sensitive wetland areas. These wetlands can significantly improve the quality of return flows from the highly industrialised and urbanised Johannesburg area. There exists the potential to develop market-based mechanisms here that encourage the township dwellers to preserve the wetland, in turn providing environmental gains, opportunities for recreational development, and improved water quality.

Box 2: The Klip River Catchment water users

The Klip River drains the area to the south of Metropolitan Johannesburg. The Greater Johannesburg Transitional Metropolitan Council operates three major wastewater treatment works in the area namely, Bushkoppie, Goudkoppie and Olifantsvlei in the southern drainage basin. Some of the effluent from the wastewater works is used for irrigation whilst the greater portion is discharged to the Klip River. The main inputs into the Klip River, other than purified wastewater, include underground mine water, urban run-off from Greater Soweto, parts of Roodepoort and Johannesburg, as well as flow from the Riestspruit which drains the Alberton, Germiston and Boksburg areas. Together these inputs to the Klip River have a negative impact on downstream users of the river water. The catchment upstream of the wastewater treatment works is severely polluted by runoff from urban and mining activities. The water quality is further impacted by the continued disruption to the maintenance of water and sewer systems. Downstream users of the Klip River water include domestic users; agricultural producers; industrial users; recreational users and the natural environment. The pollutants loads of Klip River are carried (and impact) users as far as the Vaal Barrage and Vaal River. Types of water use and potential demanders and suppliers of watershed protection services are outlined in greater details below:

- *Domestic water use:* Domestic Water use in Klip River catchment is confined to informal, non serviced settlements and because of the polluted state of the river, water is only used for clothing washing. The Klip River water quality is impacts in terms of treatment costs. Informal and unserviced settlements have grown significantly in recent years.
- *Agricultural use:* The use of river water for irrigation for agricultural lands is fairly extensive. The main crop types are vegetables, maize, wheat, Lucerne, and pasture land.
- *Recreational use:* Recreational activities in the lower Klip River includes fishing, canoeing, boating and picnicking, and church baptisms are performed in the River.
- *Industrial use:* Processing industry is the most common user of potable water but industrial use of water is very low.
- *Natural environment use:* The river is a natural phenomena and itself is considered a

8.2 The Phalaborwa Water Board

The Phalaborwa Barrage is managed by the Phalaborwa Water Board. This barrage is currently loosing water storage capacity through excessive sedimentation. The barrage is scoured on a regular basis and this leads to ecological damage in the Kruger National Park, downstream, and to a loss of the water that is used to scour the Barrage. There exists here the potential for tourists or park managers and the industrial and domestic users of treated water from the Phalaborwa Water Board to compensate the rural poor upstream (Steelpoort Valley) for providing watershed protection services, such as, improved erosion control practices.

Box 3: Water quality impacts on the Olifants river

The Phalaborwa Barrage is located on the Olifants River which is the biggest river flowing through the Kruger National Park. However, increasing demands by different activities for water in the catchment are placing pressures on existing supply. The activities in the catchment include industrial development, mining, power stations, forestry, and irrigation activities. Rapid urbanisation in the catchment is also having an impact on the water demands for domestic use. The results of these activities include soil erosion (mainly due to overgrazing), pollution of the river and deforestation. It is expected that continued pressure on the water quality in this region will lead to deterioration of the water quality in the Kruger National Park and the loss of certain aquatic species (Venter and Beacon, 1995). High salinity, pollution by heavy metals and high silt loads are regarded as the main concerns for conservation and have already contributed to the disappearance of at least five fish species in the Park. Much of the silt generated in the river downstream of the barrage is a direct result of the draining of the barrage and has been the cause of massive fish kills downstream in the Kruger National Park.

8.3 The DWAF “Working for water programme”

This Programme was launched in 1995 to "control invading alien species, to optimise the potential use of natural resources, through the process of economic empowerment and transformation". The focus is on promoting equity and improved welfare through the control of alien species that consume large quantities of water (approximately 7% available), increase flooding, fires, erosion, siltation and can cause extinction of indigenous species. The programme aims to achieve its objectives through a large-scale clearing programme, education, research and implementation of biocontrol. In total 10 million hectares have been identified for clearing over 20 years at a rate of 750,000 ha/year costing R600 million/year. Funding for the programme comes from a number of governmental and non-governmental sources. The main sponsors are the government's Poverty Relief programme, followed by DWAF. It is notable that DWAF's 1999 Raw Water Pricing Strategy incorporates a charge to help finance Working for Water activities as part of water resource management activities.

This programme currently provides the following watershed protection services and potential livelihood links (Freeman, *et al.*, 1997):

- Improved water quality;
- Improved water flows;
- Reduced pumping (extraction) demands;
- Reduced agriculture and farmer demands;
- Monetary savings for the respective water boards through reduced water management and rehabilitation costs;
- Communities with land ownership may derive returns from processing Black Wattle;
- Restoration of the productive potential of the land.

An evaluation study has recently been conducted (Goldblatt et al, 2003) on the working for water programme. This study recommends the Olifants Doorn Catchment as a good example for where this kind of watershed protection service can help to address issues of improved livelihoods.

Box 4: Some benefits of the working for water programme as evidenced in the Tsitsikamma

An area of focus for the working for water programme was the removal of alien trees in the Tsitsikamma Mountain catchment (Hosking and Preez, 1999). The aim of the Tsitsikamma study was the removal of water consuming alien vegetation and restoration of low-water consuming vegetation. The removal of these alien species provided numerous benefits including increased water yield, more natural food available to animals, greater appeal of the area to tourist and greater supplies of fynbos products (flowers, medicines, beverages and thatch), and preservation of biodiversity.

8.4 Making forest markets work for the poor

This project looks at the potential to use forest markets to improve livelihoods in the Eastern Cape. This project however, focuses on the removal of water as a stream flow reduction activity rather than on the maintenance of stream flow. The “Making Forest Market Work for the Poor” project is likely to pilot work in the Eastern Cape.

8.5 Hydro-economic modelling

The Agricultural Economics department of the University of Natal is currently developing a model that incorporates economic trade-offs into hydrological modeling, with the aim of facilitating better-informed trade-offs.

8.6 Water banking

The concept of Water banking is presently being mooted for SA. There are possibilities of piloting systems in the Mhlutuze Catchment. In this system, Licenses could be issued for certain volumes of water but due to efficiency and conservation management, less water than the allotted volume is used. The remaining volumes are banked and can be sold to other users.

8.7 Laughing Waters River Rehabilitation Programme

This river rehabilitation programme focuses on the protection of the riparian zone and hence river flow and ecosystem functioning. This initiative has linked with an Australian Institute for shared learning. There is a potential to set-up markets for watershed services such as river protection and surface or ground water improvement, such as those identified under this initiative. A water resource charge could potentially be charged to the beneficiaries of these services. Beneficiaries of these watershed services can include farmers, tourist (recreation use), catchment management agencies and fishermen.

8.8 Urban water quality initiatives

There is an Urban water quality (2010) initiative that aims to identify the impacts on water quality of certain activities and in turn identify who should be the bearer of the associated costs. There is potential to discuss this with the respective municipalities.

8.9 Comparative costs of water quality

In some cases the downstream costs of mitigation for poor water quality may be higher than upstream costs of preventing pollution. . There exists an opportunity for market incentives to address the role out of these mandates in South Africa.

8.10 CAMP project

Co-ordinated by the Centre for Land Use and Water Resources Research, University of Newcastle of the UK, the CAMP project seeks to promote new policy instruments to ensure integrated water resources management and sustainable livelihoods. The project seeks to focus on water allocation trade-offs related to land management and policy instruments that may compensate landholders for negative impacts. The project is aiming to develop a hydro-economic model that allows decision-makers to assess how different land uses impact on local hydrology and livelihoods. Work will be focused in South Africa (Levuvhu river and Lake Fundudzi, Northern Province), with satellite studies in Tanzania and Grenada. Policy instruments being considered in South Africa include: Stream Flow Reduction Licenses and the Working for Water Programme. The project will last for three years from February 2001 and is funded by the UK's Department for International Development (DFID) through its Forestry Research Programme (Landell-Mills, 2002).

The methodology adopted for the CAMP project aims to assess the trade-offs between the livelihood strategies of the rural poor and catchment-level economic productivity, which occur due to the hydrological impacts of changes in forest-related land-use. Access to water is regarded as one of the key requirements for the improvement of livelihoods in the Luvuvhu (a selected pilot site) in South Africa as it provides the opportunity for income-generating and expenditure saving opportunities. Activities within the catchment include: brewing beer, making bricks, baking bread, kitchen garden farming, irrigated farming, fishing, livestock rearing, and dryland farming, all of which are dependent on the timely provision of water (CAMP, 2003).

8.11 The DFID-SA "Water and forestry support programme"

This research initiative is one of the largest water and land-linked projects currently underway in South Africa. It recognizes that sustainable development hinges on narrowing the gap between the rich and the poor and that the manner in which this is addressed is critical to maintaining economic growth (DWAF, 2003a).

The project has two key components, water and forestry. The research projects are set out as follows:

8.11.1 The water component consists of the following three projects:

The vision of the water component of the DFID funded Water and Forestry support programme is outlined as follows:

- i) To develop methods for water use allocation and monitoring that;
 - a. Take special cognisance of the needs of the rural poor,
 - b. Ensure participation by the rural poor,
 - c. Realise tangible benefits for the rural poor,
 - d. Work with other agencies to help build their capacity to use water productively.
- ii) To pilot these methods in several catchments or study areas;
- iii) To monitor and advertise the successes of these methods to ensure that they can, and will be used.

This component consists of the following three specific focus projects:

- i) The Water Resources Management Project
- ii) The Water Services and Sanitation Project
- iii) The Department of Water Affairs Institutional Transformation

8.11.2 The forestry component consists of the following two projects:

- i) Strengthening the Chief Directorate: Forestry
- ii) Making forest markets work for the poor

This overarching programme provides opportunities for joint piloting around 1) the issues and challenges associated with legal entitlements and 2) financial capacity and mechanisms to facilitate the development thereof. The first proposed pilot catchment is the Mhlatuze catchment in Kwazulu Natal as this is one of the first catchments that will implement compulsory licensing. The “markets for watershed services and improved livelihoods” project initiative aims to support the DFID-SA research programme. As such DFID-SA are serving in an advisory role in the inception phase and diagnostic development. More information on this extensive initiative is provided in Appendix 5.

8.12 DWAF Water quality resource directed measures project

Resource directed measures are outlined in the newly released National Water Resources Strategy as a means to address water quality in South Africa. Aimed at setting standards based on the quantity and quality of water required to meet the reserve and the associated class of the resource for a particular section of a river, resource directed measures can be used to support the water quality licensing process. Resource directed measures focus on the “overall health of the water resource itself” in its entirety and “includes mechanisms to protect the character and condition of the river, riparian habitats and aquatic biota” (DWAF, 2003a). Resource Directed Measures differ from Source Directed Controls that focus on water as an input or source of water supply for use. Resource Directed Measures aim to address the management of all impacts related to water quality within the catchments in South Africa, with a focus on the social, economic, institutional and biophysical needs. These measures include:

- A national classification system for Water Resources,
- An ecological reserve which is determined in accordance with the Class of the Resource,

- Determination of Resource Quality Objectives for each class,
- A basic human needs reserve (DWAF, 2003a).

This initiative raises questions for the potential for markets for watershed services and their links to resource directed water quality measures around:

- Incentives: how they should be structured, what they should look like;
- Market mechanisms: appropriateness of choice;
- Watershed protection services: prioritisation of those addressing water quality constraints.

8.13 Strategic Environmental Assessment – Mhlathuze catchment, KwaZulu/Natal

SEA offers a valuable tool for South Africa's decision-makers as they consider how to move forward with achieving central objectives of the NWA, namely: equity, efficiency and sustainability. SEA was piloted in the Mhlathuze catchment, KwaZulu-Natal by DWAF (with funding from DFID). The aim is to provide a basis for evaluating the benefits from water according to social, economic and biophysical criteria. SEA depends on information gathering, consultation with stakeholders and transparent analysis of opportunities and constraints. By setting out benefits and costs of alternative patterns of water use, the SEA seeks to achieve broad-based understanding and consensus in making difficult decisions relating to water allocation. Following a successful pilot in the Mhlathuze, SEA has been extended to the Usutu-Mhlathuze Water Management Area and results are expected by March 2002.

8.14 Land Care

This Programme belongs to the Department for Agriculture and Land Affairs and is based on the Australian Land Care scheme. The programme seeks to tackle erosion and land degradation through revegetation and other biological controls. A number of community-based programmes have been undertaken in the former Homeland areas. There is a need for rigorous cost-benefit analysis, taking into account economic, social and environmental factors. The hydrological impacts are likely to be key.

8.15 IUCN's Water & Nature Initiative

This initiative is coordinated by IUCN and involves 50 organisations, with a budget of \$39 million over 5 years. A total of 28 projects are to be implemented to tackle the global "water crisis" in response to a call for action by the World Water Forum in March 2000 and the World Water Commission's World Water Vision. The project seeks to mainstream the ecosystem approach into river basin policies, planning and management. The Initiative is organised into 6 components: (1) demonstration of ecosystem management in river basins; (2) empowering people to participate; (3) supporting governance of water resources and wetlands; (4) developing economic tools and incentives; (5) improving knowledge to support decision-making; (6) learning lessons to raise awareness (networking). Work on component (3) will be undertaken in a number of regions, including Southern Africa (funded by DFID) where water resource management is fragmented and ineffective. Work in Southern Africa seeks to support regional and national legal and institutional frameworks that have been

defined in the SADC Protocol on Shared Water Courses and subsequent Regional Strategic Plan for IWR Development and Management in SADC. The project started in 1999 and will run until 2004.

8.16 Water, Households and Rural Livelihoods (WHIRL)

This collaborative project, which is being implemented in India (Andhra Pradesh) and South Africa (Sand River Catchment, Northern Province), seeks to promote access of the poor to sustainable water supplies for domestic and productive uses in areas of water scarcity. The focus is on how integrated water resource management can be encouraged through innovative "institutional and operational strategies" that bridge the gap between water supply, water resource management and livelihoods. The project is coordinated by the Natural Resources Institute (UK), funded by DFID and being implemented in South Africa by the Association of Water and Rural Development, an NGO based in Northern Province. Following an inception phase which ended in March 2001, the project is intended to run for 4 years.

8.17 International Water Management Institute (IWMI)

IWMI, a CGIAR institute, recently set up its Africa Office, based in Pretoria, South Africa. Its activities are split into 5 main categories including:

- Water resource management – focusing on hydrology and engineering aspects
- Water management systems for the poor – looking at appropriate technology, e.g. rainwater harvesting
- Ground Water
- Water resources policies and institutions – focusing on pricing, access for the poor, institutional mechanisms
- Environment and Health – water pollution and ecological reserve issues

IWMI's South Africa Work Programme is still evolving – so far a number of *ad hoc* studies have been undertaken. It hopes to define its strategy more clearly following a planning a workshop in January 2002. The main focus is likely to be on water and poverty in rural areas and the critical role of CMA's in tackling poverty through improved water resource management and the process of compulsory licensing. A likely geographical focus will be in the Olifants Water Management Area.

8.18 DWAF water allocations project

This DWAF initiative focuses on opportunities for water allocation, specifically to provide water (surplus) to previously marginalised groups within South Africa for the purposes of water management, development and productivity, aimed at improved livelihoods.

This project raises questions around:

- Water banking
- Economic incentives to reach equity goals, capacity efficiencies and economic returns
- Water trading
- Watershed protection services

9. What does this suggest for a programme of action learning in South Africa?

The new water legislation adopted by South Africa promotes equity, sustainability, representivity and economic performance through the decentralisation of water management, the development of new local and regional management institutions, the re-assessment of water user licensing and the potential for water rights markets (Farolfi and Perret, 2002). In light of these developments many of the questions around watershed protection services for South Africa focus on the management of water resources as a whole with specific linkages to all industrial and natural processes from forestry (natural and commercial), agriculture and industry to the ecological reserve and the reserve for basic human needs. As such, a project that focuses on “markets for watershed protection services in South Africa” needs to incorporate a broader scope beyond services provided by forests as seen in many of the other multi-country studies on services for watershed protection. The potential for adding value to the implementation processes behind the National Water Act of 1998 lies in understanding the nature of market mechanisms and how these can best be used to promote certain activities and discourage others, with specific focus on re-allocations of water to users for the purposes of development. However, water is scarce, as such the provision of watershed protection services is expected to make water that was previously allocated or inaccessible, available for re-allocation to other users.

i) Land degradation

A national review of land degradation has been conducted in order to collate information on soil and veld degradation. The main causes of this appear to be the result of changes in the composition of plant species and the threat of alien invasives. Addressing these issues in terms of watershed protection services is the working for water programme, along with economic assessment studies.

ii) Salinisation

Salinisation problems exist in a number of rivers and the establishment of watershed protection services within these watersheds will potentially address these issues.

iii) Forestry and stream flow reduction

The NWA (1998) also specifically highlights stream flow reduction activities, expressing the need within the water management sector to monitor these activities and licence then according to the water demands in the specific catchments. Forestry is often targeted as a stream flow reduction activity with direct negative impacts and is faced with increasing threats of licence reductions and reallocations. Understanding these complexities and the role for market mechanisms in improving stream flow and productivity is imperative to the implementation of the New Water act (1998).

The potential for market mechanisms to improve rural livelihoods:

Implementing institutions and mechanisms around watershed protection services raises questions around:

- **reserve allocations** and the ability of water managers to make decisions around reserve allocations for ecology and basic needs as well as for productive uses of water.
- Full information and transparency of water allocation decisions so that users have a full understanding of the **implications of their decisions** to support reserve requirements in both wet and dry seasons.
- Understanding **mechanisms** to facilitate decision-making and trade-offs.

9.1 Identified catchments

The following catchments are proposed as potential pilot catchments at this stage.

Table 10: Proposed catchments for selection and piloting

Proposed catchment	Aligned programme	Watershed service
Mhlathuze	1)DFID-SA:WFSP	Various
	2)Water banking initiative	Water supply control
Klip River	No specific programme	Water supply and water quality protection
Olifants catchment	No specific programme	Sedimentation control
Luvuvu	CAMP Project	Undefined watershed services as mainly dependent on domestic water use – perhaps water supply control

9.2 Insights into implications for market design

Due to the diversity of watershed services available in South Africa and the complexities associated with disparate income levels and accessibility to these services as well as the associated water and land resources there are a number of pertinent factors that need to be taken into consideration when considering market design. They are outlined as follows:

- High transaction costs

Transaction costs in many catchments are considered to be high due to the fact that there are often:

- Multiple stakeholder transactions,
- Poorly defined demanders and suppliers,
- Poor access to resources and services,
- Poor market access, and
- Poor information on the values and prices of watershed services,
- Administrative justice and implications for decisions.

These costs need to be clearly identified and well understood in the selected pilot catchment areas and proposed measures to facilitate the development of markets under these constraints need to be carefully formed.

- Institutional instability and change

Due to the role out of the National Water Act, there are numerous changes being observed and implemented within the water sector in South Africa. Institutional reform is one of the most obvious. There is now a shift away from the historical command and control approach to water resources management towards a decentralized management structure. This includes the establishment of Catchment Management Agencies and it is expected that these agencies may potentially serve as the intermediaries for certain watershed service transactions. However, the CMA's are only expected to become fully functioning in a few years and as such there is currently a lack of available cost effective intermediaries. The potential and support for institution building will need to be evident in the selected pilot catchments for further work in South Africa.

- Critical ongoing initiatives

Linked to the institutional changes outlined above, key initiatives such as the licencing and allocations of water resources as well as the development of water resource and source directed controls are expected to impact on the development of markets for watershed services in South Africa. It is important for market design that these initiatives are considered and are closely aligned.

- Power-imbalances

Disparities between users of catchment services in South Africa are broadly evident, ranging from ownership of land and water rights, political and institutional forums and structures, accessibility to resources, through to ability to attend key meetings and participate in processes. It is important that these disparities are clearly understood and that participatory processes are carefully managed to ensure that the use of market-based mechanisms supports an inclusive process and minimises the potential for monopolistic behaviour.

- Awareness of market opportunities and capacity to exploit these

Before markets can be established or market-based instruments created the respective 'players' need to be informed and awareness needs to be supported around opportunities for market development. The potential to exploit these opportunities and promote livelihoods improvement must be carefully assessed along with the respective needs of the different parties involved in using a specific catchment. This includes an understanding of the values and prices associated with watershed services as well as the ability and willingness of demanders to pay for these services, and linked to this the ability and willingness of suppliers to supply these services.

- Poorly defined property rights

Watershed services are not formally included in existing markets or market-based mechanisms for water resources and many of the trades for water rights operate informally and may be seasonal or permanent. In order for markets and market-based instruments to be supported, the nature and composition of these services and the property rights defining them must be formalized. This includes the structuring of the commodities that will be used to facilitate trades or transfers.

- Lack of credibility in service delivery

Perceptions around service delivery and the credibility thereof will potentially drive or hinder the development of any "silver bullets". Historically in South Africa there has been a widespread lack of credibility in water service delivery among large sectors of the population. These perceptions need to be managed and understood, along with the constraints for delivery pertaining particularly to watershed services.

- Cultural resistance

Linked to perceptions around the provision of service delivery, is a culture of resistance to changing practices and traditions and often an inability to pay for the delivery of new services.

- Gap between western views and customary law

South Africa is a country representative of a diverse and vibrant culture including divergent views on natural resource management, natural resource use and the values pertaining to these resources. An understanding of these views (the similarities and differences) related to markets, how they work, who participates and whom benefits will assist in developing market-based mechanisms for watershed services and their role in improving livelihoods.

- Variable rainfall and climatic conditions

Variable climatic conditions as well as topography will impact on the nature of the watershed services selected and the ability for upstream and downstream users to provide and benefit from these services. A thorough understanding will be needed of the hydrology and related watershed conditions in each selected catchment. South Africa has wide and established expertise in hydrological issues and management and much of this information is available through the Department of Water Affairs and other related institutions.

Other broader issues that potentially could impact on the success of the development of markets for watershed services and improved livelihoods are outlined below:

- The need for good conflict management and the selection of catchments that have established convergence and consistency in recognizing and managing priorities;
- Democratisation must be evident or supported, this refers to the inclusion of all parties in processes ensuring that their participation allows their voices to be heard even if no direct action is consequently taken;
- There needs to be evidence of support for rural stability in order to halt urbanization and encourage people to support and develop markets where they have access to the resources;
- Access to resources for basic needs must not be compromised, this includes access to the prescribed 25l per person per day and the support of food security;
- Coherent international links regarding transactions, attitudes, laws and policies need to be acknowledged and supported,
- Inter and intra catchment transfers need to be accounted for and markets for watershed services in one catchment must not compromise the provision of these services in another catchment;
- “Virtual water” impacts are being acknowledged in debates around international trade and markets, and have also been recognised on the South African agenda;
- The implications for transforming a “common good” into a “private good” need to be carefully considered especially in the context of the South African Water Act that states “Water is a national asset, and only water rights can be bought or sold”;
- An understanding of baseline flows and actions related to green (evaporation) and blue water (groundwater and surface water), including the status quo as represented by the constitution that all people have a right to access clean and safe water;
- Biodiversity and ecological impacts are closely linked to the management of watershed services and market-based mechanisms need to internalise the requirements set out by the South African Water Act stating that ecological needs as well as basic needs are part of the reserve and must be conserved accordingly;
- Issues around equity are highly pertinent and could potentially include thinking around market design that captures on the equitable shares of ecological functions such as pollution loads and their implications on human welfare and sustainability;
- Understanding the “water balance or water account” and what is available;
- Identification of indicators of progress and change as well as of the adequacy of baseline levels of provision.

9.3 Steps for action and further investigation

A broad spectrum of actions and potential research opportunities for the development and implementation of markets for watershed services and improved livelihoods in South Africa have been identified through the development of this diagnostic and broader discussions with stakeholders. General future steps for action are outlined below and will be further refined in the proposed workplan relating to this work:

A policy, institutional and legal review

- Policy review and understanding in terms of the role of watershed markets under the current policy agenda in South Africa and the specific institutions and mechanisms that will be required. Importantly assessing the implications for licencing and allocations as these will be conditional for the development of market-based mechanisms around watershed services, capacity to use water needs to be established prior to allocations,
- Including recommendations on what the Department of Water Affairs and Forestry will need to do should market-based instruments for watershed services prove to be successful and an evaluation of what they potentially could do,
- Can market-based instruments be used in the absence of CMA's, understand the role of a clearing house mechanism as another potential supporting institution,
- Development of a policy position paper.

A review of pilot catchment specific constraints and opportunities for markets for watershed services including the linkages for improved livelihoods

- Consensus on the pilot catchment selection criteria and selection of catchments,
- Thorough understanding of the potential threats and opportunities for market development aligned with the implications for market development addressed above,
- Identification and assessment of appropriate watershed services within the selected pilot catchments including an understanding and recommendations around what is sellable and feasible for pilots, what are the property rights around these services, what do they look like, how can they be packaged,
- Identification and assessment of appropriate mechanisms for the selected pilot catchments such as:
 - Direct compensation (taxes, subsidies, payments)
 - Voluntary donations (environmental fund establishment)
 - Tourism
 - Industries
 - Payment to central fund
 - Education and awareness
- Survey of the critical success factors for the selected catchments and of the boundary factors that cause markets to fail,

An institutional approach analysis of the selected pilot catchments

- Understanding of the contribution of sectors and land-uses to the economy,
- Field surveys (household level) of the relevant demanders and suppliers with a specific focus on the poor communities, what are their needs and responses,
- What are the broad levels of willingness to participate in the process and pay for watershed services, information capture around traditional beliefs and ability to participate in market development, how will a financial system be shared and supported,
- Pilot implementation of a trade (market-based mechanism) where possible and if broadly accepted

Continued alignment with existing initiatives

The initiatives outlined in section xx are closely linked to the development of market-based instruments for watershed services and improved livelihoods in South Africa. Further actions include continued alignment to the DFID Water Forestry and Support Programme, the CAMP project, the ARISE project and related DWAF initiatives.

10. Conclusions

The following general comments can be made relating to the water sector and land-use practices in South Africa:

- No fully working markets for watershed protection services currently exist in South Africa;
- There are however some good examples of where markets could be established or taken over by catchment management agencies;
- It is recommended for this research initiative that greater focus is given to the feasibility and viability of watershed protection services markets, rather than the actual establishment of fully functioning watershed protection services markets;
- In terms of the provision of water services there are critical questions around *who pays* for:
 - Making water available where needed,
 - Improving water quality and hence reducing the costs of water quality mitigation to the user,
 - Ecosystem functioning and services in catchments, for example, maintenance of the Kruger National Park system,
 - Ensuring access by rural users and facilitating the generation of income in those areas through water productivity, potential links to *poverty relief*,
- A clearer understanding of the nature and mechanisms of potential markets needs to be established, including the associated transaction costs.

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APPENDICES

Appendix 1: Summary of the wider project

1. Project overview

1.1 Background

The International Institute for Environment and Development (IIED) has undertaken a multi-country research project in order to address the potential role for markets for watershed protection services and improved livelihoods. Central to their thinking around the complexities of poverty reduction is the potential role of watersheds and the effective management thereof in meeting the needs for improved access to reliable and clean water supplies by different users and reduce vulnerability to environmental risks such as flooding, landslides and water pollution.

Insert from the IIED concept note 06/02/2001:

Today, services provided by watersheds are under threat in many contexts, and existing regulatory approaches to addressing the problems are often insufficient. IIED with its partners in developing countries have identified the need to integrate and promote approaches which can improve watershed land use and livelihoods – fitting new market-based approaches together with existing policies, incentives and institutional mechanisms that work. A four-year programme of research and action in a range of countries is proposed to increase understanding on how market-based approaches can support better watershed land use and improved water services for the benefit of poor people. The programme will have an international network-building, experience-sharing component and an action-learning component involving people in sites that can gain from working together. Four action-learning sites are proposed – South Africa, India, Indonesia and the Caribbean – to be co-ordinated by partners in those sites, with support from IIED.

The underlying driving question for this research initiative is **whether market-based mechanisms for watershed protection services can be used to better manage watersheds, relieve poverty and improve livelihoods**. Watersheds here, is used in its broadest meaning and refers to watershed land-use activities (including water, land, agriculture, forestry and other related activities). This project cross-cuts both the Forestry and Land Use Programme and the Environmental Economics Programme at IIED and as such the majority of case studies already underway have given specific focus too the role of forests, forest management and forest ecosystems as the providers of watershed services. This focus is however not exclusive and the project maintains a broad focus on country specific and relevant watershed protection services. The role of the respective country partners is to identify the nature, needs, opportunities and roles of both the services themselves and the providers and users of these services within each country, thereby broadening the scope and focus of the project. Appendix A provides context and a broader background to the “greater project” due to be completed at the end of 2002.

1.2 Country participants

The project focuses on developing countries. Ecuador, Costa Rica, Brazil and the Phillipines have been selected as case-study sites and specific research initiatives and programmes have

been reviewed in these countries. South Africa, Indonesia, India and the Caribbean have been selected as “action learning” sites and the research components here focus on the development of diagnostics and workplans for “markets for watershed services and improved livelihoods”.

2. Project overview for South Africa

2.1 Background

The CSIR, Environmentek was approached by IIED to develop the diagnostic for South Africa and in so doing identify catchments that could potentially be used as pilot case studies for further research and the development of markets for watershed protection services. As such it is hoped that there will be potential funding to continue with a three year research phase after this initial scoping phase has been completed, however, there are no guarantees for this at this stage.

2.2 Project steering committee

One of the key components of the development of the diagnostic is the establishment of a small learning group of people with expertise in the water sector in South Africa, an understanding of watershed protection services, economics or environmental economics and the social contexts within the catchments. The purpose of the learning group is 1) to assist in the identification of key issues relating to the development of markets for watershed protection services in South Africa and how these markets could potentially improve livelihoods and 2) to provide guidance in the identification of criteria for selecting catchments and the final selection of appropriate catchments for future research. Should further funding be obtained it would be beneficial if this learning group would then agree to continue to oversee the next three years of research. Much of the communication will be done via email, with time commitments in meetings approximately twice a year. At this stage time commitments include a four-hour workshop for the learning group to be held in the second week in February 2003. Followed by a short one-hour meeting in early March 2003.

2.3 Links with DFID-SA

This research initiative aims to align with DFID-SA as they have already established an extensive research programme around water related issues in South Africa leading to the recent establishment of the Water Resources Management Project. This “markets for watershed services and improved livelihoods” project aims to support the DFID-SA initiative. As such DFID-SA are serving in an advisory and participatory role on the project and diagnostic development.

Appendix 2: Project associations

2.1: Project Learning Group established

The project learning group was established in January 2003 and met at a project inception workshop on the 11 February 2003. The role of the Project Learning Group is to help guide the research during the inception phase and to potentially continue to contribute should a larger project be considered.

Name	Organisation	Role	Email address
Ashwin Seetal	DWAF	Director water allocations planning	seetala@dwaf.gov.za
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Nicola King	CSIR	Project manager	naking@csir.co.za
Martin de Wit	CSIR	Technical advisor	mdewit@csir.co.za

2.2: DFID – SA reference group established

The DFDID-SA reference group was established on the 17 September 2002, in Pretoria. The aim of this reference group is to ensure that the “developing markets for watershed services and improved livelihoods project” aligns with the extensive DFID initiatives already underway in South Africa.

Name	Organisation	Role	Email address
Bob Blakelock	DFID	IUDD advisor	r-blakelock@dfid.gov.uk
Beth Arthy	DFID	Environmental advisor	b-arth@dfid.gov.uk
Yusaf Samiullah	DFID Central – Southern Africa	Senior infrastructure, urban development & environment advisor	y-samiullah@dfid.gov.uk
Peter Smith	DFID – Southern Africa	Water sector field manager (since moved)	-
Tim Hart	RDC Prescient Consulting	Director	thart@rdc.co.za

Appendix 3: List of people contacted

Name	Affiliation	Email
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Dirk Versfeld	Independent	dirki@iafrica.com
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Harrison Pienaar	DWAF	-
Nik Sekhran	UNDP	-

Appendix 4: Learning group workshop agenda

Markets for forest watershed protection services and improved livelihoods

Learning group inception meeting

Pretoria

February 11, 2003

Project overview

Improving access to reliable supplies of clean water and reducing vulnerability to environmental risks such as flooding, landslides and water pollution are key components of strategies to reduce poverty. Both require better management of watersheds. The protection of biodiversity is critical to maintaining the resilience of ecosystems, and people that depend on these systems, to unexpected shocks. Investing in land use practices that deliver carbon sequestration and help to control climate change may prove critical to the survival of poor communities living close to sea level. Throughout the world, these and many other environmental services provided by forests are increasingly under threat, and existing regulatory approaches to addressing the problems are often insufficient.

IIED with its partners in developing countries identified the need to integrate and promote approaches that could improve land use and livelihoods - fitting new market-based approaches together with existing policies, incentives and institutional mechanisms that work. An initial one-year project of research and action in a range of countries was launched in October 2001 with work commencing in many countries at a later stage. The projects aim was to increase understanding on how market approaches could support better land use and improved delivery of environmental services for the benefit of poor people. The work was supported by the UK's Department for International Development and the Shell Foundation.

The programme involved international network-building, case study research, experience-sharing and action-learning involving people in sites that can gain from working together. Case study research in Costa Rica, Ecuador, Brazil and the Philippines was expected to help draw out lessons from ongoing experience with markets, feeding this into action-learning initiatives. Four action-learning sites - South Africa, India, Indonesia and the Caribbean (starting in Grenada) - were selected to focus on markets for watershed protection services and their potential role in improving livelihoods.

The CSIR was selected as the country partner for South Africa with the brief to conduct a scoping review of the current situation and the potential for broader project development. A diagnostic and workplan will be developed.

Meeting objective

This learning group inception meeting in Pretoria has been organised so that the respective members of the learning group can meet each other and establish a common understanding of the broader project and its implications for the South African context. The meeting also aims to establish understanding and consensus on the following:

- 1) Watershed protection services in the South African context,
- 2) Constraints and opportunities for developing markets for watershed protection services in South Africa,
- 3) Emerging drivers for markets in South Africa,
- 4) Key areas for research and prioritisation,
- 5) Established criteria for site selection in South Africa

Venue: Blue Crane Room, Building 33, CSIR - Environmentek, Meiring Naude Road, Pretoria

Participants:

Nicola King	CSIR, Environmentek
(Project Leader - RSA)	
Martin de Wit	CSIR, Environmentek
Mike Goldblatt	Palmer Development Group
Gavin Quibell	DWAF
Anthony Turton	AIWI, University of Pretoria
Heather Mackay	WRC
Abdul Kamara	IWMI
Rashid Hassan	CEPPA, University of Pretoria
Anthony Letsaolo	CSIR, Environmentek

Apologies:

Ashwin Seetal	DWAF
Bob Blakelock	DFID-SA

Agenda:

8:15	Arrival and coffee/tea
8:30	Introductions & overview of the day - Nicola King Round-table for everyone to say who they are, their interests and what they hope to get out of the day
8:45	Background & overview of project - Nicola King /Mike Goldblatt
9:15	Identification and prioritisation of watershed protection services in South Africa - All
9:45	Identification of key opportunities and constraints for developing markets for watershed protection services in South Africa - All
10:30	Identification of emerging drivers for markets for watershed protection services in South Africa and the links to improved livelihoods - All
11:00	Coffee/Tea
11:15	Identification and discussion around relevant projects and key catchments/regions for research in South Africa - All
11:45	Development of criteria for site selection for pilot case studies - All
12:15	Feedback and comments
12:30	Closure

Appendix 5: Provisional Selection Criteria

The following criterion have been tabled as potential guidelines for the selection of a watershed(s) in South Africa. They are still to be distributed to the learning group for prioritisation.

Criterion	Explanation	Link to other projects
Administrative capacity	There should be regional capacity in the regional DWAF office to support the process	DFID WFSP criterion
Strategic area issues	The area should be identified for strategic development needs, either as a Presidential lead project, or Integrated Development Zone (IDZ), or be an ISRDP node. Other agencies should be active in the area to support building the capacity to use water productively (co-operative) governance.	DFID WFSP criterion
Significant RDM requirement	There should be a significant reserve requirement, or special needs for the protection of the environment, i.e. sensitive river systems. The intention of this is to test the balance between the ecological reserve, the need to make water available for rural development, and the curtailment of existing lawful use.	DFID WFSP criterion
One catchment	There should be an effort made to do the full compulsory licencing process in at least one catchment, and to integrate all the relevant aspects of IWRM (quantity and quality).	DFID WFSP criterion
Stressed catchments	The catchments selected should be experiencing water stress i.e. the demands for water should exceed the available water and WC/DM and curtailment of existing use will be necessary to provide water to the rural poor. There should be an existing demand from users for new licences.	DFID WFSP criterion
Institutional arrangements	There should preferably also be a CMA board established – and the establishment of WUAs should have progressed well.	DFID WFSP criterion
Rural socio-economic development needs	There should be a significant rural population, preferably with clearly articulated plans for development. Other agencies should be focussing on rural development.	DFID WFSP criterion
Surface and groundwater interactions	There should be groundwater allocation problems. The water allocation plan should require conjunctive use of surface and groundwater resources to support rural	DFID WFSP criterion

	development needs.	
Water quality constraints	There should be water quality stress related problems. Watershed services should be able to address the nature of the water quality need and the associated driver.	IIED-CSIR criterion
Broad land-use activities	A wide range of land-use activities should be evident. These activities should be cross-cutting from livelihoods dependant use to commercial use.	IIED-CSIR criterion
Hydrological information available	Well-documented, quantifiable and accessible hydrological information should be available, supported by local beliefs and priorities.	IIED-CSIR criterion
DWAF priority for compulsory licencing	The area should be prioritised according to DWAFs catchment selection for compulsory licencing	IIED-CSIR criterion
Project linkages	There should be clear and supportive linkages with other initiatives in the region.	IIED-CSIR criterion
Demanders and sellers	Demanders and sellers of watershed goods and services should be evident and willing to support the broader initiative.	IIED-CSIR criterion
Tangible goods and services	The identified watershed services should be tangible within the context of the catchment. Benefits should be clearly evident.	IIED-CSIR criterion
Water trading	Informal markets for water trading should be evident. These trades may be temporary or permanent.	IIED-CSIR criterion

Appendix 6: DFID Water and Forestry Support Programme

DFID Southern Africa's £19.8 million Water and Forestry Support Programme (WFSP) was agreed in July 2002 to be implemented in South Africa. This is part of a coordinated programme with other donors in support of the South African Department of Water Affairs and Forestry's strategic plan, including the implementation of major changes in the way water and forestry issues are managed in South Africa.

Water and Sanitation Services Support	£5 million
Water Resources Support	£4 million
Institutional Transformation Support	£2.5 million
Support to Chief Directorate Forestry	£4.3 million
Making Forest Markets work for the Poor	£4 million

DFID projects provide support to projects/programmes/activities of DWAF and other South African Government Partners where DFID experience, expertise and resources will be of benefit.

South Africa Water Sector Programme

In 1994 there were an estimated 14 million South Africans without access to basic water services and 21 million without access to basic sanitation. In the middle of 2002 over half of those without adequate water supply have been provided, and a significant start has been made to reduce the numbers without basic sanitation. Since 1995 DFID has supported a growing portfolio of water sector projects by the South African Department for Water Affairs and Forestry (DWAF) totalling £9.5 million. In January 2002 a new 5-year phase was implemented as part of DFID's support to DWAF's Water and Forestry Support Programme (WFSP) – (funding table above).

Sanitation

Sanitation is often the "poor relation" to water supply. DFID has provided the main donor support to DWAF sanitation during the past 5-6 years leading to the development of a white paper which formed the basis of a major push by the Government of South Africa to increase basic sanitation and raise awareness of hygiene issues. This has been driven by a serious outbreak of cholera in South Africa 12-18 months ago. Of the estimated 17 million South Africans who live in poverty the majority (75%) live in rural areas where access to jobs, and services such as health, education, water, sanitation and electricity is limited.