Introduction

Water, a vital resource whose scarcity has been identified as a major challenge facing humanity in this new century is available in rivers. As water resources management becomes increasingly critical and as new local and national sources of water become scarce, limited, expensive and difficult to exploit many countries in the arid and semi-arid regions that are facing water crisis will be increasingly forced to consider the possibilities of utilizing the water that is available in international river basins. Thus, the concerns relating to the use of international water are becoming increasingly more important. This is certain to affect Southern Africa, a water scarce region with abundant shared rivers where region’s most of the freshwater resources exist. In these shared rivers, establishment of collaborative institutional mechanism for common management and joint development is a major key issue, determining relations and cooperation between concerned countries.

The paper deals with the institutional aspects of two selected international river basins in Southern Africa, the Limpopo and Orange. The purpose is to analyse institutional frameworks for river cooperation between basin countries on a comparative basis focusing on structure, objectives and functionality. The paper is an outcome of research work carried out by the author at the Stockholm’s Royal Institute of Technology (KTH) with a close collaboration with the University of Pretoria, South Africa during the period between 1998 and 2001 in the form of a Licentiate study. As a methodology, literature reviews and analysis of data gathered from interviews with relevant informants during visit to the study region were carried out.

The Physical, Hydrological and Development Aspects of the Two River Basins

Originating in South Africa’s Witwatersrand region, the Limpopo River (see Figure 1) draining an area of about 415 500 km$^2$ is shared by Botswana, Mozambique, South Africa and Zimbabwe. The main river (1700-km long) forms parts of the border between South Africa and Botswana, and again the entire border between South Africa and Zimbabwe, before entering the Indian Ocean through Mozambique. Located in a dry climate area with an average annual rainfall of 500mm, the basin is drought and flood prone with a total mean annual runoff estimated to 7 330 million m$^3$. South Africa dominates also the basin in terms of land occupation and runoff contribution.

No dams have been built on the Limpopo main river. However, many major dam projects have been implemented on its various tributaries. 44 large dams, 28 in South Africa, were built mainly for irrigation, domestic and industrial water supply, hydropower generation, and they also function as flood mitigation structures. South Africa, the bulk user of the river and region’s irrigator, is economically dependent on the river, and its demands are increasing. The river also supplies Eastern Botswana, the most populated and urbanized part of Botswana, including largest urban areas and large irrigation schemes in southern Mozambique. In Zimbabwe, the river has been fully developed.

The Orange River Basin (see Figure 2), with a drainage area of about 1000 000 km$^2$, covers portions of Botswana, Namibia, South Africa and entirely Lesotho, a landlocked country completely surrounded by South Africa. Originating from the Lesotho Highlands, the river forms the border between Namibia and South Africa before emptying into the Atlantic Ocean. In Lesotho, the river is known as Senqu. Having great climatological variants, the average annual rainfall at the source is 1800 mm decreasing westward to 25 mm. The natural mean annual runoff is however estimated at 11 200 million m$^3$. The Orange River with a length of 2300 km is the largest and longest river in South Africa, which again dominates the basin in terms of drainage area occupation and runoff contribution.
In the basin, South Africa has the largest industrial, agricultural and population base. These made the river to become a priority for South Africa. As a result, some of the largest and ambitious water projects to be undertaken in Africa are situated on the river, making the most developed river in the continent. 29 large dams, 22 of them in South Africa were built in the basin for a variety of purposes.

**Joint Institutions established for the Limpopo and Orange River Basins**

*The Limpopo River Basin*

In 1986, Limpopo Basin States signed in Harare, Zimbabwe, a multilateral agreement establishing a Limpopo Basin Permanent Technical Committee (LBPTC), which was set up to advise the parties on issues regarding the river. The LBPTC did not however function during its first ten years. LBPTC’s second meeting was held in South Africa in 1995. At the meeting, it was agreed to activate the LBPTC, which was a dead organization, and discussions concentrated on mutual interest regarding the common river. A joint hydrological study of the main river was agreed. After the second LBPTC-meeting, rotating meetings concentrated on the legal issue of a proposed Limpopo River Commission (LRC) at the second meeting were started. Little progress was made due to disagreements between basin States over the status of the LRC and water sharing.

Long before the LBPTC, Botswana and South Africa singed a number of bilateral agreements concerning sharing of the Limpopo. Cooperation between the two countries, started in 1967. A Joint Permanent Technical Committee (JPTC) was established in 1983 to make recommendation on matters concerning common interest in the Limpopo. In 1988, an agreement was reached on the transferring water from the Molatedi Dam on the Marico tributary in South Africa to Botswana for domestic use.

The most notable outcome of the JPTC framework is however the joint study in 1991 – the Joint Upper Limpopo Basin Study (JULBS), a pre-feasibility study determining and evaluating the most successful and cost effective method of regulating the main stream. The study concluded that anticipated dam projects on the main river were not viable for both technical and economic reasons.

During 1980s and 1990s, political situation was not favorable for real cooperation between Mozambique and South Africa on shared rivers. In 1996, after South Africa’s political change, the two countries signed in Mozambique, an agreement establishing a Joint Water Commission (JWC), with advisory functions on technical matters relating their common rivers, including the Limpopo.

*The Orange River Basin*

An interim Government instituted in 1980 in Namibia agreed with South African in 1987 to cooperate on the utilization of the Orange River. In a bilateral agreement in 1992, Namibia and South Africa established Permanent Water Commission (PWC). PWC was to act as a technical adviser to the Parties on matters relating to the development and utilization of the Orange water resources. Countries also signed in 1992 another agreement establishing a Joint Irrigation Authority, administering an existing irrigation scheme along the riverbanks under the auspices of the PWC. In 2000, the two countries agreed to carry a joint study on the Lower Orange River. The PWC is effectively functional.

Immediate after the political change in Lesotho in 1986, Lesotho and South Africa have finally signed in Maseru (Lesotho’s capital) a treaty establishing the Lesotho Highlands Water Project (LHWP), an inter-basin cross-border project transferring water from the mountainous water-rich area in Lesotho to the industrial heart of South Africa for domestic and industrial uses, and hydropower generation for Lesotho on the basis of royalties by South Africa to Lesotho for the next 50 years, making water “Lesotho’s White Gold”. In the Treaty, a Joint Permanent Technical Commission (JPTC), later renamed to Lesotho Highlands Water Commission (LHWC) with secretariat in Lesotho was established to monitor and oversee the Treaty. In addition, two implementing agencies with autonomous statutory, the Lesotho Highlands Development Authority (LHDA) and the Trans-Caledon Tunnel Authority (TCTA) were established to implement the project in Lesotho and South Africa respectively. This river cooperation, based mutual interests and benefits are well functional producing its established objectives with some minor disagreements in 16 years.

After South Africa’s democratization in 1994, a negotiation process that Namibia became instrumental was initiated aiming at establishment of a multilateral basin-wide commission for the
Orange. Despite of making some progress, the co-basin countries found some disagreement in the name and the status of the proposed river commission. Finally, the commission was created in 2001.

**Comparative Analysis and Conclusion**

*Geopolitical, Physical and Developmental Aspects*

In geopolitical terms, The Limpopo and Orange are two international river basins having the same number of basin States and forming entire or partial political borders between the States sharing it. South Africa and Botswana are both co-basin States in the river basins. In their respective basins, Mozambique and Namibia are located the furthest downstream, the least favorable hydropolitical position, as an upstream State(s) can theoretically divert and pollute the water.

Located in the same geographical region of Southern Africa, the two basins have almost similar climatic conditions with much higher evaporation than rainfall. Populations are concentrated in the upstream areas around the water divider, as main streams are remotely located from major human settlements and areas of development, another factor making their development difficult.

The two rivers’ water resources are nearly fully developed and extensively exploited for a variety of uses including irrigation, energy and domestic use, a rapidly growing sector. The level of dependence on and development of the river varies from one country to another. Most dams are to be found in South Africa, an indication of country’s economic capacity. The two rivers are by far the most important rivers in South Africa, as they sustain the most populated economic productive areas. Lower River development in Mozambique could be attributed to country’s weak economy and political instability after the independence in 1975. Given the existing level of water developments and use in upstream areas of the Limpopo Basin, it is certain that Mozambique, furthest downstream, is suffering through this process. The downstream users are affected by the upstream activities.

*International Institutional Mechanism between the Basin States*

Both for the Limpopo and the Orange, efforts have been made to reach a cooperative arrangement for the utilization of their water. Two bilateral and one multilateral cooperation in the Limpopo Basin and two bilateral cooperations in the Orange Basin were established. The LBPTC was not functional for about a decade mainly for political reasons. The LBPTC was however reactivated after the second meeting in 1995 as an immediate result of political change in South Africa in 1994. In contrary to the LBPTC, the bilateral cooperations of JPTC in the Limpopo and LHWC & PWC in the Orange are all effectively functional with different levels of achievements. In both basins, there is however a fragmented system of institutional mechanism for cooperation over the same river system. On the existing frameworks for river cooperation, the basin countries of the two river cooperate more on bilateral basis than on multilateral. The possibly reason that an observer could identify is type of cooperation arrangement (structure) i.e. multilateral and bilateral. Co-basin countries that are ready to make river developments and have difficulties to wait for an overall agreement covering the entire basin prefer to cooperate on bilateral basis because they find easier to achieve their interest. Although bilateralism in multilateral basin is not a sustainable approach to cooperate in the long-term, it operates however more practically. In multinational river basins, bilateral framework for cooperation has technical advantages and short-term benefits while multilateral framework, if possible has political advantages and long-term benefits for all. A bilateral cooperation as part of multilateral framework could be an alternative approach for basin-wide cooperation. However, establishment of a joint institution in any shared rivers takes a long period of preparation.

Based on the study, factors with greater influences on the establishment and the functionality of an international river cooperation include (1) type of the cooperation – bilateral or multilateral; (2) objectives and scope of the cooperation; (3) mutual economic interests of individual co-basin countries in the cooperation; and (4) politics between the basin countries. It is also essential that functions and objectives of joint institutions should be clear and addressing certain specific issues.

As sustainable development for the entire river basins needs to be approached from a comprehensive basin overview rather than from individual national viewpoints or bilateral basis, two separate processes to establish multilateral river commissions for the two basins have been started
after the political change in South Africa in 1994. The two cases are somewhat identical as far as the newly proposed multilateral river commissions are concerned. Disagreements that delayed the establishment of the commissions are also almost the same. The negotiation processes show the complexity of finding a basin-wide platform for collaboration between the basin countries of the two rivers. It showed that Mozambique is positive but also sceptic mainly concerned in its position.

**Joint Water Development Projects on International Rivers**

Based on the two case studies, the paper shows that implementing joint water projects on an international river are mainly influenced by three major factors in combination: physical geography of the river; riparian countries’ economic interests in the joint water project; and political relationships between and within the countries concerned. The LHWP jointly undertaken by Lesotho and South Africa became viable to implement because of these factors. The same factors hindered the anticipated water project from the JULBS on the Limpopo River between Botswana and South Africa.

![Figure 1. Limpopo River Basin in Southern Africa](image1)

![Figure 2. Orange River Basin in Southern Africa](image2)