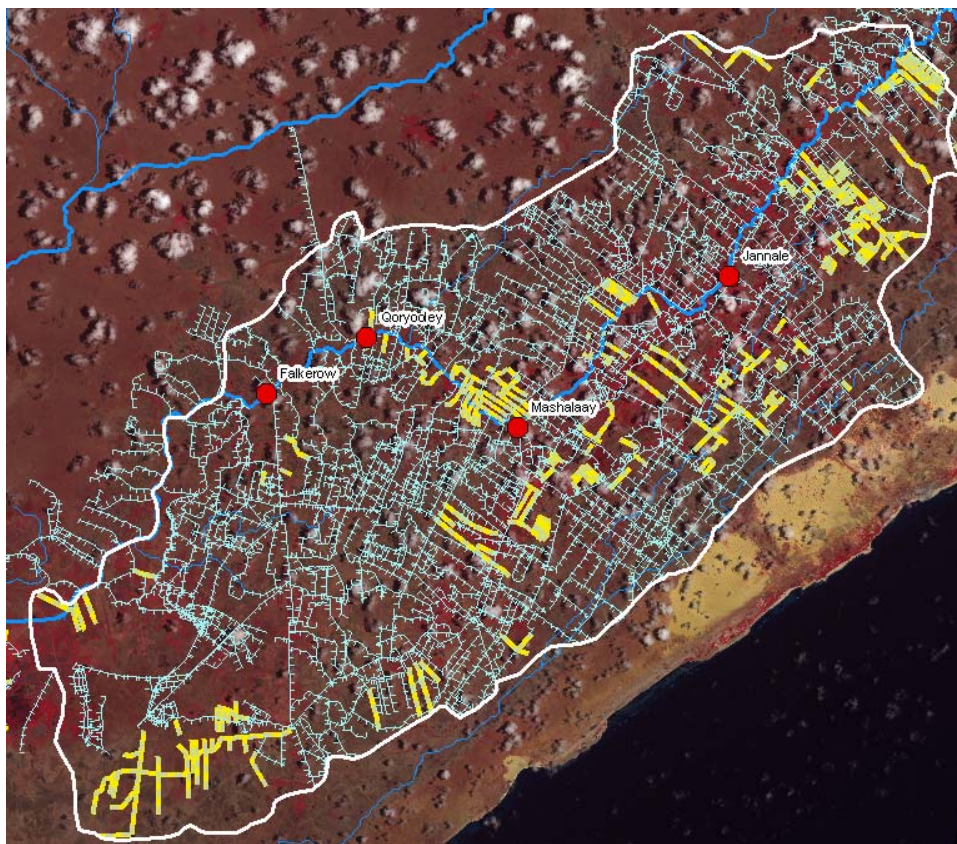




Status of Medium to Large Irrigation Schemes in Southern Somalia



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This report is a result of an initiative by FAO SWALIM to identify the status of medium to large irrigation schemes in Southern Somalia for partners and donors active in the irrigation sector in Somalia.

The assessment is based on document reviews and key contact interviews, digital irrigation infrastructure datasets developed by SWLIM using GIS and remote sensing as well as on the consultants' experiences in irrigation and drainage.

The consultants appreciate all the SWALIM staff for their valuable support throughout the assignment. Special thanks to Mr Musse Shaye for his contribution in identifying and verifying all irrigation schemes and to Mr. Craig von Hagen and Mr. Dickson Aduwo for the GIS work.

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Executive Summary

The Juba and Shabelle river basins have been, and could again be, the breadbasket of Somalia. They have considerable potential for irrigation development, and several irrigation schemes have been developed on these two major river basins to provide sustainable food security and alleviate poverty in the country. However, due to 16 years of civil insecurity and unrest the majority of these schemes have collapsed.

Based on the conclusions and recommendations of the "Banana Sector Study" prepared by the European Commission (EC, 2002), the European Commission has moved to restore some irrigation facilities, and rehabilitate and maintain former irrigated plantations and irrigation schemes.

The EC-funded Somalia Water and Land Information Management (SWALIM) project, as part of its objectives, addresses the need for information products and services to improve agricultural production. In line with this objective, SWALIM undertook a comprehensive study to identify the status of medium to large irrigation schemes in Southern Somalia. The overall objective was to provide a database and information on the status of the irrigation infrastructure, which has been progressively declining since the break out of the civil war in 1991. The assessment consisted of:

- (i) A desk-based assessment
- (ii) Built up of a baseline irrigation infrastructure database from existing topographic maps and satellite images
- (iii) A rapid field assessment on the major river regulation infrastructure in the Shabelle River basin.

In the desk-based assessment, the documents reviewed included a number of pre-war studies, designs, concept papers, feasibility studies and scheme assessments. All these documents contain information on individual schemes or a cluster of a few schemes, which provides very fragmented information, without giving a general overview of a larger area required for the management of several inter-related schemes. Based on the fragmented information this report presents a systematic collection of most available data and information on the irrigation schemes and irrigation infrastructure.

Extensive GIS work was carried out to identify major irrigation canals. The canals were digitised from the existing topographic maps, originating from the 1970's and reflecting the existence of the irrigation schemes at that time. These maps were overlaid by another set of data on canals. This latter set was derived from mainly Landsat satellite images reflecting the situation at the beginning of the new century. Even a simple visual interpretation gives very quick and interesting impression of the development. Surprisingly, the comparison shows that numerous new canals can be detected. NDVI analysis was also performed to try to identify if the schemes around the canals are operational or not. This work has not been completed yet. However, one of the main achievements of this exercise, besides identifying more than 5,000 km of canal infrastructure, is that of identifying the real boundaries of the irrigation schemes. The irrigation schemes many times were not developed to the size planned in their designs, and little information was available before this study on the actual size implemented.

Field visits and interviews were organised with barrage operators and communities. These interviews provided valuable information on the operational status of the irrigation

infrastructure. Digital photos linked to GPS coordinates were also taken to provide information on the status of canals and flow regulators. Key contact interviews were conducted with lead agencies active in the irrigation sector in Southern Somalia. Information gathered determined operational status, types of crops grown, management and administration of schemes and their major irrigation infrastructure, including river regulation works, primary and secondary canals and their command areas, areas currently under irrigation, potential for future development and on-going rehabilitation efforts. Preliminary results gained in GIS work were discussed in detail at workshops and interviews in order to verify the data derived by remote sensing.

The report is divided into five main sections:

- (i) Methodology
- (ii) Natural resources
- (iii) Legal-institutional aspects
- (iv) Establishment of digital irrigation infrastructure dataset
- (v) Status of irrigation infrastructure and schemes

The above structure is supposed to provide baseline data and information for various users including (i) donors and investors considering various options of rehabilitation; (ii) designers of irrigation schemes who need all natural resources and other information if possible in one report; and (iii) scheme managers and operators who need detailed infrastructure information.

Based on the literature review, contact interviews and information and data gathered during the study, the following can be summarised:

Pre-War Status

1. Agriculture was the primary water user in Southern Somalia with the pre-conflict irrigation systems. The medium to large irrigation schemes relied on water from the Juba and Shabelle rivers.
2. There were two major types of river water use for agricultural production in the Juba and Shabelle basins: a) flood recession (*deshek*) cultivation, and b) irrigated agricultural systems (pump or gravity supplied), originally based on a limited number of gated gravity fed river intakes.
3. Irrigation water was abstracted either by barrages with weirs controlling water flow into primary supply canals, or by pumped intakes drawing irrigation water directly from the rivers into primary canals.
4. Ten river regulation systems (barrages) existed, viz. the Fanoole Barrage, which is the only barrage identified on the Juba River, and the Sabuun, Balcad, Genale, Mashalley, Qoryooley, Falkerooy, Kurtunwareey, Sablaale and Haway barrages, all of which are situated on the Shabelle River.
5. Water uplifting infrastructure in Juba valley in 1990 consisted of 2 major and 2 minor pumping stations in Badheere dam for sugarcane production in Juba sugar project, a pumping station at Mogambo for rice production and 140 pump sets with an average lifting capacity of 170 l/s for banana production at Kamsuma.
6. The canal system comprised of primary, secondary and numerous tertiary canals. However, some small (private) canal systems originated directly from the two rivers. The primary canals were designed to have enough head to reach fields through secondary canals and, further down, through smaller tertiary canals to the individual farm intakes.

7. Pre-conflict irrigation infrastructure was intact and delivered the required amounts of water to medium and large irrigation schemes as planned, designed, operated and managed, up to the time the war broke out in 1991. Nearly 90% of the schemes were operational before the war, the majority being located in Lower and Middle Shabelle and Lower Juba regions.
8. From literature, estimates of the area under controlled irrigation for all the schemes in Juba and Shabelle before the break out of the civil war is 161 583 ha. However, some of these schemes may not have been fully operational all the time. The ministry of Agriculture estimates that in 1987/88 cropping year, 112 950 ha were under controlled irrigation, while 110 000 ha was under flood recession irrigation, giving the total irrigated area to 222 950 hectares. The main crops grown included sesame, maize and vegetables (Ministry of Agriculture, 1988).
9. Pre-conflict management and administration of medium to large scale irrigation schemes and irrigated farms in Southern Somalia were under the overall supervision of the Land and Water Department in the Ministry of Agriculture. Commercial concessions for bananas and sugarcane growing and processing were considered private investments and were therefore managed and administered privately.

Present Status

Regarding the present status of the irrigation infrastructure, the study made a big step towards identifying the boundaries and the relevant canal systems of 32 irrigation schemes. The study further identified that:

10. All the ten barrages used for regulating water for irrigation before the break out of the civil war are currently not operational and require major rehabilitation work. Generally, the gates are stuck and embedded in mud, while lifting gears are broken. The main cause of failure is neglect and lack of maintenance during period of civil unrest.
11. The efficiency of canals in delivering water to the irrigation fields decreased to almost zero, with some breaking down completely. This is as a result of poor maintenance, leading to build up of silt and vegetation along the canals.
12. The 125 pump sets used for water uplifting before 1990 in Lower Juba are all either looted or failed and have been inoperative since the outbreak of the civil war.
13. River embankments for both Juba and Shabelle have been weakened by farmers in an attempt to access water after the breakdown of canals and barrages.
14. There are new canals developed in the irrigation schemes, and in some cases improvements done on the existing canals. From the GIS work, over 5,000 km of canal currently exist in Southern Somalia. Majority of the canals however require rehabilitation, as they are not currently operational.
15. The irrigation schemes which existed before the break out of the civil war are either partially operational or not operational at all. Less than 50% of what previously existed before the break out of the war is currently operational.

Further analysis of the conditions of the more than 5 000 km of canals, including siltation survey and data on culverts, road crossing and flow diversion structures will however require either extensive field surveys of many teams or the use of very high resolution aerial photography (Lidar). Analysis of the present, ever-changing, ad-hoc management structures of the schemes would also require new socio-economic field surveys.

Glossary of Somali Terms

| | |
|---------------|---|
| <i>Dyer</i> | Rainy season that normally occurs from October to December |
| <i>Gu</i> | Rainy season that normally occurs during April to June |
| <i>Jilaal</i> | Dry season from January to April |
| <i>Hagaa</i> | Season of coastal showers, normally between July and August |
| <i>Wadi</i> | A non-perennial (seasonal) stream |

Abbreviations and Acronyms

| | |
|----------|--|
| ARDO | Aaran Relief and Development Organisation |
| ARDOPIIS | Agricultural Rehabilitation and Diversification of High Potential Irrigation Schemes in Southern Somalia |
| ASTER | Advanced Spaceborne Thermal Emission and Reflection Radiometer |
| Care SSS | Care Somalia South Sudan |
| CCS | Committee of Concerned Somalis |
| CEFA | European Committee for Agricultural Training |
| CIDA | Canadian International Development Agency |
| CIDRI | International Co-operation for an Intergrated Rural Development |
| CINS | Cooperazione Italiana Nord Sud |
| DBG | Daryeel Bulsho Guud |
| EC | European Commission |
| EDF | European Development Fund |
| FAO | Food and Agriculture Organization of the United Nations |
| FEWS | Famine Early Warning System |
| FSAU | Food Security Analysis Unit |
| GIS | Geographical Information System |
| ITCZ | Inter-Tropical Convergence Zone |
| ITF | Inter-Tropical Front |
| JOSSR | Jowhar Off-Stream Storage Reservoir |
| JSP | Juba Sugar Project |
| LANDSAT | Land Satellite |
| NASA | National Aeronautics and Space Administration |
| NDVI | Normalized Difference Vegetative Index |
| NGO | Non Governmental Organization |
| PACSU | Project Assistance, Capacity Building and Supervision Unit |
| RCMRD | Regional Centre for Mapping of Resources for Development |
| REMPAI | Resource Management and Policy Analysis Institute |
| SACB | Somalia Aid Coordination Body |
| SACO | Somali Agriculture and Commercial Operation |
| SADO | Social Life and Agriculture Development Organization |
| SDA | Settlement Development Agency |
| SDIO | Society Development Initiative Organization |
| SOM | Somalia |
| SSHDA | The Sool, Sanaag & Hawd Development Agency |
| SSS | Somali Support Secretariat |
| SWALIM | Somalia Water and Land Information Management |
| TCP | Technical Cooperation Programme |
| TOPO | Topographic Map |
| UK | United Kingdom |
| UN | United Nations |
| UNDP | United Nations Development Programme |
| US/A | United States of America |
| USAID | US Agency for International Development |
| USBR | United States Bureau of Reclamation |

Spelling of Places Names

Spellings on place names in Somalia are very variable. Attempts have been made to use the same spellings throughout this document. To avoid misunderstanding, English and Italian spellings are given where these differ.

| Somali | English | Italian |
|----------------|----------------|----------------|
| Afgooye | Afgoi | Afgoi |
| Awdheegle | - | Audegle |
| Balcad | Balad | Balad |
| Baraawe | Brava | Brava |
| Buulo Mareerta | Bulo Marerta | Bulo Marerta |
| Falkeerow | - | Falcherio |
| Gayweerow | - | Gaiuero |
| Golweyn | - | Goluen |
| Hargeysa | Hargeisa | - |
| Haway | Avai | Avai |
| Janaale | Genale | Genale |
| Jilib | Jilib | Gelib |
| Jowhar | Jowhar | Giohar |
| Kismayo | Kisimaio | Chisimaio |
| Marka | Merca | Merca |
| Muqdisho | Mogadishu | Mogaddiscio |
| Qoryooley | - | Coriolei |
| Shabelle | Shebelli | Scebeli |
| Shalambood | Shalambot | Scialambot |

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