

## Water

In this chapter, maps and data on surface- and ground-water, irrigation, floods, and urban water supply are presented. The surface waters of the country can be subdivided in the following drainage basins, that sum an area of about 1.3 million km<sup>2</sup>, of which more than half is outside the country: 1) Gulf of Aden basin; 2) Darror basin; 3) Tug Der/ Nugal basin; 4) Ogaden/Central basin; 5) Shabelle basin; 6) Juba basin; 8) Lag Dera basin; 9) Lag Badana basin; 10) Coastal basin (see maps on page 57 to 59).

The Shabelle River joins the Juba before this flows into the Indian Ocean (just north of Kysimayo), but it is only in occasion of large floods, which are rare, that the Shabelle waters reach the Juba River. Similarly, waters from seasonal rivers like Lag Dera occur only during extreme rains and it is very rare that they join the Juba River. Hence, technically, both Shabelle and Lag Dera Rivers are tributaries of Juba. The Shabelle is an aggraded river, meaning that its waters normally flow for most part of its reach at a higher elevation than the surrounding floodplain. The Juba is a river where the waters normally flow at a lower level than the floodplain. The Shabelle is thus more prone to flooding (see scheme on page 60).

The river waters were largely regulated in the past. This was done by means of major storage irrigation infrastructure including river barrages: the Fanoole Barrage is the only barrage identified on the Juba River. Sabuun, Janaale, Mashalley, Qoryoole, Falkeroo, Kurtunwareey, Sablaale and Hawaii were all operating along the Shabelle River (see map on page 62).

Systematic **river gauging** was, and is, carried out only in the two perennial rivers Shabelle and Juba. Before 1991 stream flow data were available for 7 stations on the Juba River and 7 on the Shabelle River. At the present moment only four river gauging stations are in operation (two on the Juba and two on the Shabelle). The main hydrographic characteristic of these two rivers is that they lose flow and load as they proceed downstream, thus testifying some sort of spillage from the embankments or other forms of water extraction along the river course (see maps on page 61 to 63).

The **drainage basins** in the central and northern regions of the country are only ephemeral. The very little surface runoff and rainfall falling in the basins are mostly lost through infiltration and evaporation. The majority of flash-floods events are localized in these types of streams. There are however some short streams (toggas) especially in the mountainous regions in the north that have flow through out the year in some stretches. There is a complex surface water-groundwater interaction along the toggas, whereby in some stretches there is surface runoff and in others there is mostly sub-surface interflows and recharging of groundwater aquifers. Natural springs are also common in the mountainous regions of the north where some impermeable rock outcrops intersect the groundwater tables. Sub-surface flows along the toggas and groundwater available in springs (mountainous areas) and in shallow and deep aquifers are an important source of water for people and livestock living in these drainage basins. Catchments rainwater harvesting through *wars* and *berkads* is also here prevalent.

The **alluvial plains** of the Juba and Shabelle Rivers have been and potentially still are the food basket of the country. Here fruit, cereals and vegetables were extensively cropped, occupying nearly 90% of the entire population. They had and still have considerable potential for irrigation development, as demonstrated by the large and medium irrigation schemes (accounting for some hundreds of kilometres of canals) here developed in the past and

## Biyo

Cutubkan waxaan idiinku soo gudbin doonnaa khariidado ku saabsan biyaha dusha iyo kuwa gudaha, habka waraabka, daadadka iyo hanaanka biyo siinta magaaloyinka. Biyaha laga helo dusha sare waxaa loo qaybin karaa biyo-shubyada hoos ku xusan kuwaasoo mara dhul baaxaddiisa guud ay dhan tahay 1.3 million km<sup>2</sup> oo in ka badan bar ay tahay meelo ka baxsan dalka: 1)Gacanka Cadan; 2)Aagga dooxada Darroor; 3) Biyo-degga Togdheer iyo Nugaal; 4) Biyo-degga Ogaden iyo midka gobollada dhexe; 5) Biyo-degga shabeele; 6) Biyo-degga Jubba ; 7) Biyo-degga Lagdera ; 8) Biyo-degga Lag Badanna,Biy-degga xeebaha; (eeg khariidada ku yaal bogagga 57-59)

Wabiga shabeelle waxa uu ku darsamaa wabiga Jubba inta uuna ku darsamin Badweynta Hindiya (meel wax yar waqooyi ka xigta Kismaayo), laakiinse qaab fatahaad ayay biyaha Wabi Shabeele ku gaaraan wabiga Jubba waana dhif. Sidoo kale biyaha ka yimaada Lagdera waa kuwo yimaadda oo kaliya marka ay roobab badani da'ayaan kadibna waxay ku darsamaan wabiga Jubba.Sidaas darteed, Farsamo ahaan, Shabeele iyo Lagdera labaduba waxay biyogeeyaan Juba.

Wabiga Shabeelle waa wabi si wacan u socda taaso macneheedu yahay in biyihisu caadi ahaan ku maraan dhul ka sarreeya oogada daad mareenka ah ee ku hareeraysan. Wabiga Jubba waa mid ay biyihisu caadi ahaan ku maraan dhulka ka hooseeya oogada daad mareenka ah ee ku teedsan, sidaas awgeed ayaa fatahaadu ugu badan tahay wabiga Shabeele (fiiri shaxda bogga 60).

Wagii hore socodka biyaha waa la maarayn jiray. Qaababaka lagu maareyn jiray socodka biyaha waxaa ka mid ahaa kaabayaal lagu habeynayo hanaanka waraabka laguna kaydinayo biyaha wabiga,biyo xireenka Faanoole waa midka kaliya ee laga hirgeliyay wabiga Jubba, wabiga Shabeele waxaa laga hirgeliyay biyoxireeno dhawr ah oo ay ka mid yihiin Saabuun, Janaale, Mashalley, Qoryoole, Falkeroo , Kuntuwaarrey Sablaale iyo Hawaay ( eeg khariidada bogga 62).

Hanaanka lagula socdo xaddiga biyaha ayaa laga hirgeliyay labada wabi ee Jubba iyo Shabeelle. Ka hor sanadkii 1991 macluumaadka ku saabsan xaddiga socodka biyaha wabiga waxaa lagala socon karayay 7 barood oo ah wabiga Jubba iyo 7 barood oo wabiga Shabeelle ah ku yaal. Hadda 4 kaliya unbaa ka shaqeysa dhamaan barahaas (2 ku yaal wabiga Jubba iyo 2 ku yaal Wabiga Shabeelle)

Hanaanka la socodka biyaha labada webi waaxuu qeexayaa in heerka biyuhu yaraanayaan oo socodka biyaha is dhimayo marka hoos u sii socodo taasoo muujinaysa nidaamka biyo ka baxa qararka wabiyada ama qaabab kale oo biyaha lagu xirto (fiiri khariidada 61-63).

Biyo kadegyada ku yaal gobolada dhexe iyo kuwa waqooyi ee dalka waa kuwo cimri gaaban, roobka da'aana isla markiiba si dhaqso ah ayuu kaga luma si ah in dhulku liqo ama si uumi bax ah.

Qaalibka dhacdooyinka daadadku waa kuwa ka jira dooxooyinka. waxaa kaloo jira togag yaryar gaar ahaan gobolada buuraleyda ee dhanka waqooyi kuwaasoo ku biya shuba meelo jeexdimo ah. Togagga waxaa ka jirta isdhexgal ka dhex dhaca biyaha dhulka ku jira iyo kuwa sare maxaa yeelay waxaa mararka qaarkood dhacda inay is dhexgalaan labada hanaan. Gobolada buuraleyda waqooyiga waxaa kaloo ay caan ku yihiin durdurada dabiiciga ah halkaasoo dhagaxyada aan biyuhu ka dusi karin ay kala jeexaan salka biyaha dhulka. Biyaha sare waa kuwo mara togagga halka biyaha

now almost entirely collapsed. In these alluvial plains there were two major distinct uses of river water for agricultural production: i) flood recession (deshek) cultivation and, ii) irrigated agricultural systems (pump or gravity supplied) originally based on a limited number of gated gravity fed river intakes. The canal system was designed for having main canals, from which enough head was assured to the fields through secondary canals and further down, smaller tertiary canals to the individual farm intakes. The irrigation waters were abstracted from the river either by barrages with weirs that controlled the water flow into the primary supply canals or by pumped intakes that drew the irrigation water directly from the rivers into the primary canals. Actual estimates of irrigated area show impressive numbers: 222,950 hectares for the whole country in 1987/88 cropping year, of which 109,350 ha in the south. In addition to this 110,000 ha were cultivated under flood recession irrigation (see maps on page 65 to 76).

Along the Juba and Shabelle alluvial plains (known as the riverine area), floods are the most prevalent type of natural disaster, whereas flash floods are common occurrences along the intermittent wadis in the north of the country. Both river floods and flash floods cause high numbers of casualties. As the population grows and urban development encroaches into traditional floodplain areas, in the riverine areas, and in the towns the potential for loss of life and property will rise in the coming years. Historically floods have affected the riverine areas during the Deyr season (October to December) of the years 1961, 1977, 1997, 2002 and 2006, and during the Gu season (April to June) in 1981 and 2005. The last three major flooding events had magnitudes larger than the one associated with the historical 50-year return period flood event (see maps on page 77 to 79).

Even if the trend toward an increase in flood frequencies is questioned, it is certain that the economic damage and casualties that result from flooding in the area have increased with time. For example, the number of fatalities attributed to the 1997/98 El Niño floods were the sixth highest total attributed to floods globally for the decade of the 1990s. The increase in both severity and damage (both economic and casualties) caused by floods, apart from the natural increase in frequency and severity mentioned already, is due to several other human-made factors like: 1) The encroachment of people upon traditional floodplains, as population increases and pressure on land increases, is leading to enlarging the number of people dwelling in traditional floodplain areas. Predictably, as more people start living in floodplains, the potential for loss of life and property will rise; 2) The major flood relief channels that were maintained by government departments before the start of the civil war are in disrepair. Floods that are caused by the poor state of the flood relief canals occur mostly in the Lower and Middle Shabelle areas; 3) The deterioration of the river embankments and their unrestricted breaking for irrigation purposes often leads to flooding during periods when the river levels are still below historical bankfull stage.

**Groundwater** is the main source of water for the majority of the people in Somalia, except the ones living along the Juba and Shabelle rivers. Data on the aquifers and ground water systems in Somalia are scattered and scarce. Investigations and groundwater explorations have been carried out for specific locations by different agencies but a country-wide data are lacking.

A general description of the hydro-geological subdivision of the Country accounts for the following aquifers: a) Basement Complex (also known

dhulku ay ku jiraan durdurada (goobaha buuraleyda), sidoo kale biyaha dhaw iyo kuwa qotodada dheerba waxay muhiim u yihiin dadka iyo xoolaha ku nool deegaanada biyo degeenka ah. Sidoo kale biya celinta warooyinka iyo barkadaha ayaa iyaguna ah mid jirtaah oo badan. Dhul beereedka ku teedsan wabiyada Jubba iyo Shabeelle ayaa ah saladda (dambiisha) cuntada ee dalka, waxaa deegaanadan laga beertaa miraha, khurada, galleyda waxaana kasoo baxa khudaar, miro iyo galley dadka deegaanka meelahani waxay muhiim u yihiin hormarinta beeraha sida ku cad qorshayaasha dhexe iyo kuwa mudada fog ee hormarinta waraabka beeraha (waxaa jira boqolaal kanaal) inkastoo ay kaabayaashaasi hadda burbureen. Deegaanada biyaha leh ee dhooboda waxaa looga faa'iideysan jiray laba hab.

1- hanaan beereedka biyo celiska dhulka (dhesheeg)

2- habka waraabka beeraha iyadoo la isticmaalayo matooro ama soo jiidid

Hanaanka kanaalka waxaa loogu talo galay in la dhiso kanaalo badan taasoo u saamaxaysa beeraha inay soo galaan biyo mareeno ku filan kuwaasoo usoo maraya kanaal kasoo baxa wabiga iyo kanaalo yaryar oo loogu talo galay beeraha yaryar. Hanaanka kanaalka biyaha waraabka waxaa laga soo jiiday wabiga iyadoo la isticmaalayo biyo celis kadibna kanaalada lagu soo shubo ama waa mid si toos ah looga soo shubo wabiga oo lagu shubo kanaalka qaybiya. Tirakoobka ku aaddan xaddiga deegaanka wax laga beerto waxaa uu muujinayaa in sanadkii 1987/88 uu ahaa 222950 hektaar, 109,350 hektaar waxay ahayd deegaanada koofurta waxaa intaa dheeraa in xadi ah 110,000 hektaar lagu beeray iyadoo laga faa'iideysanayo hanaanka biyo celiskadhulka (dhesheeg) ( fiiri khariidadaha 65-76)

Deegaanada ka ag dhaw wabiyada Jubba iyo Shabeelle masiibada dabiiciga ka dhacda ee ugu dhibka badan waa mid ka timaadda fatahaad ka timaadda wabiyada, dhinaca waqooyigana togagga soo rogmada ayaa dhibaato dadka gaarsiiya, labadan nooc ee fatahaadda ahi khasaaroyin badan ayay keenaan maadaama dadka iyo deegaankuba ay si aad ah ugu sii badanayaan meelaha wabiyada u dhaw-dhaw khasaaraha ka iman kara sanadaha soo socda waxay noqon doontaa mid baaxad leh. Markaa aan taariikhda dib ugu noqonno daadad dhibaatooyin keenay ayaa ka dhacay agagaarka wabiyada intii lagu jiray xilligii Deyrta sannadihii 1961,1977,1997, 2002 iyo 2006, sidoo kale dhibaatooyin noocan oo kale ah ayaa dhacay intii lagu guda jiray xilligii Gu'ga (April-june) sanadihii 1981 iyo 2005. Sadexda dhacdo ee ugu danbeeyay dhibaatooyin waxay ahayd mid ka baaxad weyn middii dhacday 50 guuradii daadka. (fiiri khariidadaha ku sawiran bogagga 77-79)

Waxaa isweydiin mudan xaddiga kororka soo noqnoqodka daadka, waxaa kale oo xusid mudan in khasaaraha dhaqaale iyo midka nafeed ee daadadku ay sababaan uu yahay mid isa soo taraya sanadba sanadka ka danbeeya, tusaale ahaan xadiga khasaaraha ee ka dhashay daadadkii El-nino ee 1997/1998 waxa uu ahaa midkii ugu darnaa aduunka-heerka lixaad- intii lagu jiray sagaashamaadkii. Kororka khasaaraha naf iyo maalba leh ee ay daadadku sababaan waxaa qayb ka qaata arrimo ay dadku keeneen sida dadka oo aad ugu sii durkaya goobaha wabiyada u dhaw:1) Maxaa yeelay maadaama ay tirada dadku sii kordhayso waxaa iyaduna kordhaysa ahmiyadda dhulka taasoo kordhinaysa tirada dadka ku nool daafaha wabiyada. Saadaal ahaan maadaama ay dad badani ku nool yihiin daafaha wabiga waxaa la filan karaa khasaare badan oo naf iyo maalba leh; 2)-Qaababka biyo celiska iyo biyo saarka ee ay xukuumaddii hore sameysay waa kuwo aan dib loo hagaajin intii ay dagaalada sokeeye socdeen. Daadadka ay sababaan dayactirla'aanta qaababka biyo celiska iyo biyo saarka inta badan waxa uu ka dhacaa wabiga shabeelle-gaar ahaan shabeelaha dhexe iyo shabeelaha hoose.

3-burburka ku yimaadda daafaha wabiga iyo qoditaanka lagu sameeyo gabiga wabiga si wax looga waraabsado waxay sababtaa inay fatahaadi

as the “Buur Area”) in the centre, Xuddur-Bardheere Basin to the north and Coastal Basin and to the south; b) Upper and middle Shabelle valley, Mudug-Galgadud Plateau and Coastal belt; c) Gulf of Aden Coastal Belt and Sloping Plain, Mountainous Zone incised by numerous togas and the Plateaus and Valleys which include the large undulated Haud and Sool plateaus and the Nugal and Daroor valleys (see maps on page 80 and 81). Few Urban Water Supply schemes have been recently rehabilitated by different agencies. Some examples are also presented in the maps on pages 84 to 86.

A comprehensive **water sources inventory** survey conducted by SWALIM in Somaliland (May – June 2008) and in Puntland (June – July 2008) covered all strategic water sources: boreholes, dugwells, springs and dams. The outcome is an inventory of over 1,600 water sources: 300 boreholes; 862 dug wells; 287 springs; 124 dams and 36 other source types. For each source type, data was collected on: location of the source, functional status and users, physical parameters, water quality, ownership, supply and distribution. Basic analysis on the data indicated that 61% of the strategic water sources surveyed are communal, and 88% are operational. The depths of the boreholes vary from 17m to 440m, and the depth of the shallow wells varies between 1m and 56m. The static water level during time of the survey varied from 5m to 230m for the boreholes, and from 0.1m to 23.90 m for the shallow wells. The ranges for pH and EC are 6.9 – 9.8 and 100 – 8,380  $\mu\text{S}/\text{cm}$  respectively (see maps on pages 82 to 83).

SWALIM, in partnership with ICRAF and the local administration and communities, did an assessment to identify the potential for **Rain Water Harvesting (RWH)** in Somalia producing a common framework for planning, designing, implementing and monitoring RWH projects in the country (see maps on pages 87 to 88).

dhacdo iyadoo biyaha wabigu ay yihiin heer aan gaarin fatahaad.

Biyaha ku jira gudaha dhulka ayay ku tiirsan yihiin inta badan dadka soomaaliya marka laga reebo kuwa ku nool daafaha wabiyada Jubba iyo Shabeele. Macluumaadka ku saabsan biyaha ku jira dhulka Soomaaliya waa kuwo aad u yar oo aan lahayn goob loogu hagaago. Baaritaano ku saabsan biyaha gudaha ayaa hay'ado kala duwani ay ka fuliyeen deegaano kala duwan laakiinse arrintaasi ma aha mid gaarsiisan heer qaran.

Macluumaad guud oo ku saabsan qaybaha ay Soomaaliya u qaybsan tahay marka laga hadlayo qiyaasta heerka biyaha ayaa tibaaxaya in waddanku u qaybsan yahay dhawr nooc:

- A)- qaybta hoose (ama aagga Buur) taasoo ah dhinaca waqooyi bartamaha, biyo degga Xuddur illaa Baardheere, dhinaca koofurta biyo degga xeebta.
- B)- Shabeelaha dhexe iyo sare, Oogada Mudug-Galgaduud iyo laynka xeebta
- C)- Jiidda xeebta ee gacanka Cadan iyo oogada janjeera, aagga buuralayda dhexda ku leh togagga banaanaada iyo waadiyada kuwaasoo ay ku jiraan gubanta Sool iyo Hawd iyo waadiyada Nugaal iyo Daroor oo intooda badan yihiin dari iyo god (**fiiri khariidada 80-81**).

Hay'ado kala duwan ayaa dhawaan dayac tiray mashruucyo lagu fidinayo adeega biyaha deegaanada qaar, dhawr tusaale ayaa lagu soo bandhigayaa khariidadaha bogagga 84-86.

Tirakoob Dhammaystiran ee Ilaha Biyaha ee Soomaaliland iyo Puntland. Hayadda SWALIM ayaa waxay ka fulisay gudaha Soomaaliland ( May-June 2008) iyo Puntland tirakoob dhammaystiran ee ilaha biyaha oo koobaya dhammaan meelaha biyaha laga helo oo isugu jira Ceelal riigga, ceel gacmeedyo, ilo iyo harooyin (waro). Tirakoobkka waxaa ka soo baxay inay jiraan guud ahaan 1600 oo ilo biyo oo kala ah:300 ceel riigyo; 862 ceel gacmeedyo; 287 ilood; 124 harood iyo 36 noocyo kale. Nooc kasta ilo biyood ah waxaa laga soo uruuriyey xog la xiriiirta oo ah: meesha laga helo biyaha, sida markaas uu u shaqeeyo iyo isticmaaleyaasha, dhabiicadda biyaha, tayada biyaha, lahaanshaha, waxsoosaarka iyo sida loo qaybsado. Baarista asaasiga ah ee macluumaadka waxay muujinaysaa in 61% biyaha habboon ee la daraaseeyey ay yihiin kuwo lahaansho guud, iyo in 88% ay yihiin kuwo shaqaynaya. Dhererka gunta hoose ee ceelal riigyada waxay dhaxaysa 17m iyo 440m, ceel gacmeedyada waxay u dhaxaysaa 56m iyo 1m, halka heerka sugan ee biyaha ceel gacmeedyada ay u dhaxayso 0.1m iyo 23.9m, kuwa ceel riigyadana ay u dhaxeeyaan 5m iyo230m. Isbedellada waxay u dhaxeeyaan pH 6.9 - 9.8 kuwa EC iyaguna waxay u dhaxeeyaan 100 - 8,380  $\mu\text{S}/\text{cm}$  (**fiiri khariidada 82-83**).

SWALIM, oo ay shaqawadaag yihiin ICRAF iyo maamullada degaanka iyo bulshada, waxay qiimayn kuurgal ah ku sameeyeen sida biyaha roobka loo qabsan karayo soomaaliya gudaheeda si loo soo saaro hannaan qorshe, hindise iyo hirgelin iyo kormeer mashaariiceed dalka gudihiisa (**fiiri khariidada 87-88**).