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Land Resources Development Centre

Somali Democratic Republic
National Tsetse and Trypanosomiasis Control Project
Land Use Survey

Resource Development in the Shabeelle Valley

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LRDC

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Overseas Development Administration

tend to fall light during the night. In the March/April period prior to the gu', nocturnal wind speeds are often too low to be measured and are also variable in direction. Temperature inversion develops (at least in the middle Shabeelle) between midnight and dawn; dawn is indeed usually the calmest time of the day. During January, February and March the wind comes predominantly from the east; during April to June wind direction shifts through southeast to southwest, and is generally less predictable. Data collected by the Jubba Sugar Project during January to December 1978-9 suggest that windspeeds between 00.00 h and 06.00 h are lower in that region than in areas further north.

3.4.5 Humidity and Evaporation

At most stations the relative humidity averages 60-75%, with highest values in May/July and again in October while the December/March period is generally less humid. Humidity rather consistently declines with distance from the coast. Recorded levels of evaporation and computed evapotranspiration tend to vary inversely with humidity. Evaporation in the interior is in excess of 2 500 mm where it greatly exceeds annual precipitation. Consequently, in those areas, soil moisture deficits prevail for much of the year and vegetative growth tends to be highly seasonal. The length of the growing season and the severity of the soil moisture deficit are major factors determining range productivity.

3.5 VEGETATION AND RANGELAND RESOURCES

Very little natural vegetation survives as most of the Shabeelle Valley area has been cultivated, grazed and burned over for centuries. The natural vegetation which does survive and the secondary vegetation types which have become established reflect the different combinations of climate, soils, and land-use which occur. Further variations are introduced by the ground water supplied by the river and the swamp areas of the Shabeelle.

Definitions of the physiognomic terms used to describe the various vegetation types are given in NTTCP/LUS (1985) and the distribution of vegetation types is shown in Map 1a and Map 1b.

All forests of the Shabeelle Valley are ground water riparian types as rainfall is inadequate to support any other vegetation of forest stature. The forests are one of the few natural vegetation types surviving but are rapidly disappearing as riparian land is cleared for cultivation. In addition to the present river channels, many former meander channels continue to support forest or woodland and thicket. Very little remains of the Shabeelle forests which originally would have extended from the tail swamps to the upper limits of suitable river alluvium near Buulobarde.

The characteristic vegetation of much of the Shabeelle valley area and especially of the interriverine plains is a low deciduous bushland and shrubland mixture remarkable for its monotonous uniformity and with only slight variation from place to place in the association of a relatively small number of dominant species. The bushland and shrubland may remain drought dormant through much of the year. Typical species of the deciduous bushland and shrubland include Acacia bussei, A. seyal, A. reficiens, A. nilotica, A. nubica, A. mellifera, A. tortilis, A. senegal, Dobera glabra, Gardenia fiorii, Cordia sinensis, Grewia tenax, G. villosa, Combretum spp., Commiphora spp., Euphorbia spp., Thespesia danis and Dichrostachys spp. Boscia spp., Cadaba glandulosa and Maerua spp. are notable as minor evergreen components of the otherwise deciduous bushland/shrubland. Terminalia orbicularis is very frequent on heavier soils and Phyllanthus somalensis characteristically fringes seasonal water pans and water courses. When the bushland is opened up by fire, productive perennial grasslands can be formed and typical grasses include Chrysopogon plumulosus, Sporobolus helvolus, Cenchrus ciliaris, Andropogon kelleri and Eragrostis spp.

The low deciduous bushland and shrubland extends onto the coastal dunes where it is frequently dominated by Acacia tortilis and A. senegal. Other common dune bushland species are Cordia somalensis, Terminalia

spinosa and, south of Baraawe, Adansonia digitata. Most of the deciduous bushland plants also occur on the dunes and are supplemented by numerous additional species to produce a rich and diverse flora. On the seaward side of the dunes, the vegetation assumes a prostrate physiognomy under the influence of strong prevailing winds. The beaches themselves carry a specialised flora which includes Ipomoea pes-caprae, Scaevola plumieri, Atriplex farinosa and Sporobolus spicatus. Of particular interest is the sedge Cyperus chordorrhizus which dominates large areas immediately above the beach and provides important grazing. Open areas within the dune bushland support excellent grass cover and Cenchrus ciliaris grows vigorously.

Extensive tracts of saline soils within the Shabeelle Valley area (LR 5) support a specialised halophytic flora. Halophytes include Sueada spp., Salsola sp. and a Limonium sp.. Urochondra setulosa and Sporobolus spicatus are frequent halophytic grasses, U. setulosa dominating extensive grasslands.

A series of freshwater swamps have developed in the extensive poorly drained areas of the Shabeelle valley. Some of the swamps appear to be undergoing cyclic change. Whilst some are drying up, others are, in effect, becoming lakes. Thus, certain of the Shabeelle swamps are obviously drying up, while the Hara Naga is now open water with dead trees which would have grown under drier conditions still standing in the shallows. Open water areas are usually clear of vegetation and the shallower margins support semi-floating aquatic plants such as Nymphaea spp., Nymphoides sp. and Pistia stratiotes. Further into the shallows large communities of Typha latifolia and Phragmites karka occur.

The bushlands and shrublands, together with the grasslands derived from them, constitute the rangeland resources of the Shabeelle Valley area. Whilst many of the trees and shrubs are essential browse plants, the rangeland is in its most productive condition when a balance is maintained between the relative proportions of grasses and woody plants. Fire is the major factor involved in maintaining the grass-bush balance. In the absence of regular fires the woody plants become

dominant except in the relatively small areas where salinity or waterlogging prevail. Ideally grazing management should provide adequate grass fuel to permit burning at regular intervals.

3.6 WILDLIFE

The lower Shabeelle Valley harbours a considerable proportion of the surviving remnants of Somali wildlife, particularly those species which require access to permanent water. Included in this category are elephant, hippopotamus, buffalo, bushbuck and waterbuck. The Shabeelle swamp areas are important habitats for these wildlife species. The riverine areas and especially the swamps support large and diverse populations of birds.

The only wildlife sample censuses ever undertaken in this area were completed by RMR in November/December 1983 and March 1984 as part of the NRA Southern Rangelands Survey. Wildlife was shown to be concentrated in the undeveloped parts of the Shabeelle Valley area. Lesser kudu and gerenuk are the most numerous wildlife species and also the most widespread, though both species avoid intensively cultivated areas. Other wildlife species present in considerable numbers include Speke's gazelle, Grant's gazelle, oryx, reticulated giraffe, warthog and baboons.

Many areas of natural riverine wildlife habitat and vegetation communities have already been disturbed or destroyed by agricultural development. This trend is continuing. Most species of wildlife have been affected by this development and by illegal hunting for trading of trophies. It is estimated that over 20 000 elephants have been killed since 1979, representing perhaps two-thirds of the 1979 elephant population (RMR, 1984).

According to RMR, wildlife constitute an insignificant proportion of the total herbivore biomass (including domestic livestock), being only 2.5-5% of the total. It is therefore certain that wild herbivores do

CHAPTER 8 PASTORAL DEVELOPMENT

8.1 INTRODUCTION

The southern rangelands of Somalia constitute one of the major natural resources of the country. They contribute to the support over 80% of the national cattle population, 55% of the camels, and 15% and 35% of the sheep and goats respectively. Exports of live animals from the major southern ports have constituted a growing portion of foreign exchange earnings and now account for perhaps 20% of the total foreign exchange earnings. Livestock populations have been expanding in southern Somalia over the last 30 years, particularly of cattle and sheep, despite the short term losses caused by periodic droughts.

The southern rangelands are thus an important resource for the Somali economy. Their development and preservation should therefore be a priority in national development planning. For a number of reasons it is now becoming increasingly urgent that this be recognised and that development programmes be prepared for implementation. These reasons are principally: (1) the rapid increases in human population, agricultural land development and related aspects of land use in southern Somalia; (2) the increases in livestock populations (which may be further raised by disease control programmes such as the tsetse and trypanosomiasis control programme), (3) the indications that changes may be occurring in rangeland condition that imply overgrazing and degeneration in some areas, and (4) concern that control or eradication of tsetse fly may alter the patterns of rangeland use and lead to deterioration in riverine rangelands.

These trends, and the land and rangeland resources of the area, have been reviewed at reconnaissance level in NTTCP/LUS (1985). The Southern Rangelands Survey carried out by RMR (Watson and Nimmo, 1984, 1985) for the NRA has provided detailed objective descriptions of range vegetation resources and condition, and a sample census of livestock populations. NTTCP/LUS studies have interpreted the patterns of movement of livestock

as they affect the major riverine and associated rangelands. These studies thus provide some of the resource data required for rangeland development planning and it is an opportune time to consider the requirements and priorities for further development.

8.2 INSTITUTIONAL FRAMEWORK FOR RANGELAND DEVELOPMENT

The National Range Agency is the Government agency responsible for all aspects of rangeland development, including forestry and wildlife preservation. The NRA is an agency of the Ministry of Livestock, Forestry and Range and is the executing agency for all major rangeland, forestry and wildlife development projects (with the exception of some small scale forestry programmes attached to refugee settlements). The agency currently coordinates rangeland development programmes covering north and central Somalia (NRDP and CRDP) and has initiated the Southern Rangelands Survey. The various components of these programmes are administered by project managements responsible to the NRA for operational programmes agreed and funded by a variety of external donor agencies and banks. The project managements presently report directly to the General Manager of the NRA and are administered at the national headquarters.

It is anticipated that this structure and scale of operation may not be appropriate for future rangeland and pastoral development programmes. The NRA does not have the capacity to support further large scale projects, such as the NRDP or CRDP, to cover the whole of the southern rangelands. In addition, and of particular importance in the southern rangelands, the necessity for close integration of rangeland with other land-use and rural development programmes at a local area level is more difficult to realise in large projects administered from the national NRA headquarters. Such development programmes must be planned and implemented with the continuous close involvement of local people and rangeland users. It is therefore recommended that future programmes are organised on a regional or district basis.

The development of the southern rangelands cannot be considered in isolation from other trends in land-use development, or from the development programmes operated by other ministries and agencies in the area. While the development of large parts of the northern and central rangelands may continue relatively independently of the small amount of agricultural land development, in the southern rangelands a completely integrated approach is essential. The river valleys constitute an important agricultural development resource (especially for irrigation) as well as a vital component of seasonal grazing patterns. There will inevitably be competition for the use of these resources. Development of these areas should also, ideally, be considered in an even wider context of overall rural development, involving the provision of access, communications, settlement planning, social services, water supplies, agriculture and livestock development services, together with rangeland development.

This type of development would require some changes in the present methods of regional and district level planning, coordination and administration. It would also necessitate the strengthening of the capability of regional level staff in the NRA and other regional departments of Government. Regional level staff would need to be able to conduct and analyse detailed surveys of range resources and their use, to plan and implement range rehabilitation and development programmes, and to coordinate these plans with other sectoral plans at the regional or district level. Some changes might also be necessary in the relationship between regions and the MNP to allow integrated programmes to be presented as a whole rather than as individual sectoral plans.

Coordination between ministries and agencies involved in the various aspects of rangeland and rural development is also essential at central Government level. Although, at present, the Ministry of National Planning nominally appears to be responsible for such coordination, in practice it cannot exercise an effective coordinating role during the important early planning stages of any particular sectoral programme. Rather the MNP acts as a collating agency, collecting, budgeting and

controlling expenditure on already formulated sectoral plans. Real coordination of planning can only be achieved by continued consultation between concerned ministries and agencies from the early planning stages through implementation. Some effective mechanism for such coordination must be found. For land development programmes an inter-ministerial consultative board should be established with the aims of continually reviewing land development programmes and ensuring coordinated development. Such a board would need to be served by a permanently established inter-ministerial secretariat or unit to undertake the necessary monitoring and planning work, as outlined in Chapter 9. Concerned ministries should include at least the MOA, MFLR (including representation from NRA and NTTCP), MNP, MLGRD, and the Ministry of Minerals and Water Resources (including the WDA).

8.3 PRIORITY AREAS FOR RANGELAND DEVELOPMENT IN SOUTHERN SOMALIA

Constraints on the capacity of the NRA to mount comprehensive rangeland development programmes throughout southern Somalia necessitate the selection of priority areas for immediate attention. The criteria for selection of these areas should include the present condition and trend of the rangelands, the relative importance of the area in the grazing system, the potential for improvement or protection through management, and the potential effects of other land-use changes or programmes such as tsetse eradication on the use of the rangelands.

On these criteria, priority areas for management in southern Somalia would be rangelands in a seriously degrading condition and the rangelands in the major river valleys. Sand dune fixation programmes are already underway to tackle the eroded coastal dunes. Other areas in need of rehabilitation include the intensively settled rainfed farmed areas and associated rangelands.

The major important grazing areas are in and around the Shabeelle and Jubba River Valleys. It is in these areas that the greatest potential for land development exists and where competition for resources is most likely to occur. It is also in these areas, or in some of the

associated rainy season rangelands, that changes in rangeland condition appear to be occurring which may indicate overgrazing, particularly the reduction of grasslands and bushed or shrubbed grasslands. Riverine rangelands may also be subject to some changes in the seasonal patterns of grazing following tsetse eradication.

Land use planning in the Jubba Valley is presently underway as part of the Ministry of Jubba Valley Development programme. Detailed planning of rangeland development will not be possible until present land resource and ecology studies have been completed, and until decisions on the options for the Fanoole dam, a barrage at Saakow, or the Baardheere dam have been made. For these reasons, and because land use and settlement is not yet as intensive in the Jubba Valley as in the Shabeelle, the Jubba Valley may be regarded as a secondary priority for rangeland development planning. The third priority for development would be the trans-Jubba rangelands. These at present appear to be under the least pressure from land settlement or livestock populations, and the tsetse infested areas are unlikely to be affected by fly control for a long time. They are areas of high potential for rangeland development though, and would therefore merit attention. GTZ have already prepared proposals for a programme of combined tsetse control and rangeland development in the 'Kenya salient' tsetse infested area.

The proposals presented in this report are therefore centred on the Shabeelle Valley. This area is characterised by rapid human population growth and agricultural land development, pressure for refugee settlement and high livestock populations. Within the Middle and Lower Shabeelle regions, however, contrasting circumstances of present land use and future development potential are presented by different areas of land. The area may be divided into the relatively intensively developed and settled Middle Shabeelle Region and the less intensively settled Lower Shabeelle Region (though settlement now extends into Lower Shabeelle Region on the south side of the river in the Jannaale/Qoryooley area, and southwards down the alluvial clays close to the coastal dunes from Marian Guwaay to Mudun). In the Lower Shabeelle Region, the north and south banks of the river may be distinguished by

the potential and probability of agricultural development and settlement. On the north bank, marine clay plains of low potential for widespread agricultural development extend from the river for 60-80 km. On the south bank there are considerable areas of relatively high potential soils in a high rainfall zone, which are likely to come under settlement within the next 10 to 20 years. Five zones with different rangeland and development needs and opportunities may thus be distinguished:- (1) Middle Shabeelle Region, including intensively settled riverine and rainfed farmed areas in Jawhar and Balcad Districts, (2) rainfed farm and remnant rangeland areas in Wanlaweyne District, (3) Afgooye, Marka and Qoryooley Districts on the south side of the river, representing relatively intensively settled areas where development and settlement are proceeding, (4) Lower Shabeelle north bank rangelands from Qoryooley District downstream to the Jubba Valley, representing rangelands which are unlikely to be widely settled but which constitute a major rangeland resource for the interriverine livestock population and (5) Lower Shabeelle south bank rangelands in Baraawe District, including alluvial plain areas of high potential for future agricultural settlement, and also including the coastal dune rangelands which form an important part of the overall grazing system. The patterns of movement of animals and the use and condition of these rangelands are described in NTTCP/LUS (1985).

Rangeland and land use development plans are required for each of these zones. The priorities, however, are felt to be the Lower Shabeelle rangelands, since these constitute the largest and most important rangeland resources and since they may be under most threat from settlement in the short term, or from overgrazing and changes in rangeland condition. They may also represent a slightly simpler rangeland/land use planning and management problem, compared to the complex land use problems in already settled areas such as Middle Shabeelle Region.

8.4 STRATEGY FOR PREPARATION OF AREA SPECIFIC RANGELAND DEVELOPMENT PLANS

Within priority areas selected on the basis of the criteria described in section 8.3, the approach to the establishment of rangeland and pastoral development plans would be as follows:

1. Feasibility study and planning of rangeland and pastoral development programme for an identified priority area; preparation of project proposal.
2. Establishment of rangeland and pastoral development project in appropriate regional NRA base; preparation of detailed rangeland, land-use, and rural development plans for the area.
3. Implementation of rangeland development programme.

These phases of an overall programme would be established by the NRA as the availability of trained Somali staff and recurrent funds allowed. NRA would also need to recruit donor funding and technical assistance.

8.4.1 Components of rangeland development programmes

The detailed components of rangeland development plans for specific areas will depend on the circumstances and problems of the area. There are nevertheless certain general components which will be necessary in all programmes. These include:

1. Institution strengthening in the regional and district NRA organisation, including the development of facilities, provision of equipment and transport, and training of staff.
2. Integrated rangeland, land-use and agricultural development planning, with the inclusion of wider aspects of rural development

planning if possible. Such planning will necessitate detailed survey and analysis of present land-use, range condition and seasonal grazing patterns.

3. A programme of extension and contact with rangeland users to prepare appropriate associations of users for discussion of range problems and development needs, and to initiate the process of involvement of all users and Government departments in development.
4. Pilot range management programmes, to introduce and investigate suitable range vegetation management, rehabilitation and improvement methods, as well as to develop the methods of involving the user associations in such management programmes. Pilot programmes may then be expanded as successful management is developed.
5. The provision of rural services. Services such as animal health and water supplies are obvious immediate requirements of rangeland users and their provision would help to secure involvement of users. Other services such as human health and education, access and communications, and extension to improve rangeland use and animal husbandry could be developed subsequently where appropriate.

Institution strengthening will be required in all range development projects. Regional NRA offices have insufficient staff, facilities and equipment. Existing staff are poorly trained, have no practical experience in operational field programmes, lack essential basic practical skills in range vegetation evaluation, mapping, resource evaluation and planning, and lack organisation and management. There is only limited support in these spheres from the national NRA headquarters. Training programmes have been established in the recent past to produce diploma and graduate level staff, though both theory and practical aspects of this training could be improved. These staff require further in-service and formal training in specific skills in functioning regional range management programmes.

Rangeland survey and planning components are required in order to make a more detailed evaluation of present resources, land-use and rangeland

conditions in specific development areas than is provided by present reconnaissance surveys. This information will allow the integrated planning of agricultural development and settlement where relevant, with rangeland development and the improvement of rural services including water, roads, social services and others. This component will also need to establish at regional level the planning processes needed to ensure coordination with other regional departments of Government. Planning is seen as a continual responsibility of the regional NRA, with the need to monitor range condition and use, livestock populations and movements, and land settlement, and to adapt and coordinate range management plans in accordance with changing circumstances.

The types of information required for particular rangeland development project areas would include the following:

1. Detailed mapping at about 1:100 000 scale of present land-use and rangeland vegetation types, based on airphoto interpretation of the 1983/84 photography and ground checking.
2. Identification of all major grazing areas or degaans, particularly all riverine areas. Investigation of seasonal patterns of use of grazing areas, seasonal stocking densities in all seasons, origins of visiting animals and movement routes into and through the project area, and the expected influx and origins of animals during droughts.
3. Monitoring of range condition in all major grazing areas and vegetation types, based on existing RMR Southern Rangelands monitoring sites. Establishment and survey of additional sites if necessary. Identification of degrading areas as a priority.
4. Location and survey of permanent stock water sources, riverine drinking points and man-made wars. Exploration of water resources for development.
5. Preparation of range management plans for different grazing areas and vegetation types, including identification of areas to be

reserved, areas to be rehabilitated (and appropriate methods of rehabilitation), range management techniques to be applied in different parts of the range (for example control of water availability, the use of fire, control of stock numbers and seasons of grazing where necessary) and the social and institutional aspects of applying range management through associations of users.

6. Agricultural land development surveys, considerations of land capability for settlement and agriculture, suitable farming systems for settlement plans, prediction of human populations and settlement patterns, requirements for fuelwood, forestry development and other forms of land-use.
7. Livestock development surveys; including livestock populations, veterinary service requirements and programmes for the area, other constraints and particular opportunities for livestock development, identification of requirements and opportunities for further integration of livestock and crop production, and for livestock production research and extension.

The involvement of the present users of the rangelands and farmlands in the planning and development process is essential to the success of these programmes in the long term. There is currently little contact between the Government departments at regional level and the pastoralist and farming communities in the field. Representational structures exist in these communities which could be developed into more formal associations for the purposes of articulation with local Government organisations. A considerable Government effort in extension and communication will, however, be necessary to establish and use new links to these associations.

The form of associations of rangeland users and farmers that may be appropriate may vary in different localities depending on existing social structures and the composition of the user population. Thus, in areas with a relatively settled local pastoralist population, grazing associations with rights and responsibility for development in specific areas of land may be appropriate, while in other areas with a very mixed, seasonally nomadic, user-population a different kind of

consultative organisation may be required. In southern Somalia there are often both nomadic pastoralists and partially settled mixed farming communities making use of the land resources. Forms of representation must be developed which can involve both communities. Recent progress by the CRDP in the formation of Range and Livestock Associations could provide experience and a methodology for similar initiatives in southern Somalia. Such approaches must be a major component of future rangeland development programmes.

Practical field range management interventions cannot be implemented immediately throughout the priority areas because of the limited capacity of the NRA at regional and district levels, and because further detailed planning may be required in some areas. There are, however, a number of range management techniques that could be applied in advance of comprehensive planning in certain key areas. Further investigations are also required into other techniques that may be useful in range rehabilitation and improvement. Such activities would ideally be initiated in relatively small pilot range management programmes which could be expanded as successful techniques were developed and as NRA capacity increased. Pilot range management programmes would also provide an essential focus for staff training in practical skills and in the development of consultative links with local range users. The experience of these initial approaches would then be valuable for longer term planning for wider areas. Pilot programmes might be envisaged to introduce management into selected areas of 100-500 km² within a 1 000-2 000 km² project area.

8.4.2 Organisation and costs of range development programmes

Project preparation Project preparation for particular regional range programmes would require a 3 to 4 man team for 2-3 months, with the objectives of preparing a project proposal for the NRA to submit to Government or to donors for financing.

The proposal would specify the areas to be incorporated in the project and would identify possible pilot management areas. It would detail the

necessary NRA institution building and other components, and list all inputs and costs of the programme.

The preparation of such proposals would require a range management/development specialist and a pastoral sociologist, with a land-use planner/agriculturalist and/or a livestock development planner as necessary according to priorities and potential for particular types of development in different regions. Costs of such project preparation missions may be estimated at US\$40 000-60 000.

Project implementation Implementation of the projects would require long term funding and the provision of technical assistance for at least 6-10 years. The development of basic NRA infrastructure including housing, offices, workshops, stores and the provision of equipment for both the survey and planning work and the field range management operations. The former would include facilities for air-photograph storage and interpretation, mapping, and data recording, storage and analysis. Range management equipment would include tractors, bulldozers, brush cutters, trailers and technical equipment for range vegetation survey.

Technical assistance staffing would include a range management specialist, livestock development planner, land-use planner, sociologist and training/extension specialist, with short term inputs from an air-photography interpreter, water resources hydrogeologist and planning economist. Technical assistance staff should be involved in both the range and land-use development programme and in formal and in-service training of staff.

The establishment of infrastructure and equipment may be anticipated to take up to one year. The survey and planning components might take a total of two years. Establishment of a pilot range management programme could be accomplished in 2-3 years, though the results of range improvement interventions would not be available before 5 years. Initial establishment of such a regional programme may be estimated to cost up to US\$1.0 million in facilities and equipment. Operating and technical

assistance costs may be estimated at up to US\$0.5 million per year. A five year programme may thus be anticipated to cost US\$2.5-3.5 million.

8.5 INDICATIVE RANGELAND MANAGEMENT PROBLEMS AND PROPOSALS FOR PRIORITY AREAS

As an illustration of the constraints and opportunities for rangeland development, this section presents some preliminary observations on the development of priority areas in the lower and middle Shabeelle Valley. These are not comprehensive land development plans but considerations of the types of range management proposals that might be appropriate in different circumstances.

8.5.1 Lower Shabeelle South Bank Rangelands

Text Map 6 illustrates the lower Shabeelle north and south bank rangelands. The areas for which indicative range development plans are proposed initially cover the north bank rangelands from Aw Dheegle downstream and the south bank rangelands from Baraawe/Mudun south to Homboy.

8.5.1.1 Rangeland resources and land use

The range resources, livestock populations and the patterns of seasonal movements of livestock in these areas have been discussed in NTTCP/LUS (1985). Briefly, the south bank rangelands include the coastal dunelands, the alluvial and marine clay plains inland of the dunes, the riverine tsetse infested bushland and thicket rangelands and the lower Shabeelle swamps. Small areas around some settlements are developed for agriculture but the area is mainly used as rangeland. A small resident livestock population is maintained in the area making use of different range resources in different seasons. Camels, cattle and goats graze in the dunelands during the rains. At the end of the rains cattle and some

goats progressively move to the clay plains and to the riverine rangelands in the late dry season, especially in jilaal. Camels remain mainly in the dunelands and clay plains.

During the dry seasons, particularly in the haggai season when the area receives coastal haggai rains, visiting stock come from the interriversine rainy season rangelands and from the drier areas of the upper and middle Shabeelle. Visiting camels tend to use the coastal dunelands and clay plains, while cattle use the clay plains until local water sources (particularly the roadside borrow pits) have dried out when they move closer to the riverine rangelands and river drinking points.

The water resources of the area include a series of sweet-water beach wells, natural ponds in the dunes which dry out rapidly in the dry seasons, roadside borrow pit ponds along the new Mudun to Jilib road, and the river and swamp watering points (these are shown on Map 6 in NTTCP/LUS, 1985). In addition, a limited number of wells exist and a pumped borehole at Ashanle near Mudun.

Much of the area has high potential for agricultural development, with Class 1 and 2 soils and high rainfall (see Map 2). Settlement is favoured away from the river due to the problems of flooding, mosquito and other health problems in the river valley. The SDA, with World Bank support, is currently looking for up to ten 2 000 ha sites to establish rainfed farming settlements in the area, and the NRC is preparing proposals for settlement in a 16 000 ha site between the Goof River and the Mudun to Soblaale/Haaway road, just to the north of the rangeland study area. Independent spontaneous settlement and expansion of human populations and farmed areas is also occurring.

In view of the relative underdevelopment of the riverine and swamp fringe areas for agriculture, the lower Shabeelle swamps between Madax Maroodi and Biliq Tale comprise the best remaining opportunity for wildlife and habitat preservation in the Shabeelle Valley, though pressure for development is mounting and access by cattle (on the south side, and by both camels and cattle on the north side) is essential for dry season

water and forage. It is proposed elsewhere (Section 10.8) that this area be preserved from further agricultural development in a National Park or Reserve. Its existence must therefore be accommodated in range-land development planning.

Only a few rangeland monitoring sites have been studied in these rangelands. In general, the area does not appear to be over-exploited, though there is some evidence of bush encroachment in the marine clay plain areas and also in lower river course and swamp fringe thickets. The latter may be related to changes in the elephant population and patterns of flooding. The duneland rangelands appear subjectively to be in reasonable condition but it is known from similar dunelands between Marka and Baraawe that they are susceptible to damage from overgrazing, cultivation and stock trails to beach wells which can result in serious gully erosion, especially on the steeper seaward slopes. Areas of exposed eroded white sands also exist (though these are caused by beach erosion and wind deposition rather than by overgrazing) which cover potentially productive rangelands and threaten settlements and roads in places. These, and some areas of severe gulley erosion of the red dunes, would be priority areas for emergency rehabilitation.

8.5.1.2 Range development proposals

Rangeland development and land use planning proposals for the area must take account of the land resources, present and potential land use, and the trends described above. The following suggestions deal mainly with range management aspects but it would clearly be necessary to incorporate other forms of land use into an overall land use plan.

Rangeland management plans for the area would be drawn up according to the general types of investigations outlined in Section 8.4. The particular priority requirements for the south bank rangelands would also include the following:-

1. identification of exposed and eroding red and white sand dune areas and preparation of rehabilitation plans.
2. identification of key riverine rangelands for use in dry seasons and droughts.
3. development of range management techniques for the principal rangeland types (initially for dunelands and clay/alluvial plain bushlands).
4. organisation of overall rangeland management plans.

The identification and rehabilitation of exposed and eroding red or white sand dunes may be considered as a relatively isolated component of the overall programme. The areas involved are small and could be removed from the grazing system for rehabilitation with little effect on surrounding rangelands. The experience and techniques developed by the Sand Dune Fixation Project at Baraawe will be of relevance to other areas.

The components of the project would be the identification, mapping and area measurement of the eroding areas, the study of causes and remedies for particular areas, and the application of suitable techniques of protection from stock, reduction of wind erosion, circumvention of water gully erosion and replanting. The establishment of nursery facilities for preparation of suitable planting materials would be required. A final component would be the development of land use plans, including recommendations on siting or prohibition of cultivation, bunding and damming drainages, siting and control of stock routes, and recommendations of stocking densities for fragile areas.

The lower Shabeelle rangelands and swamps are important dry season rangelands for both resident and visiting stock. They are also recognised as vital drought refuges of last resort for stock from even wider origins, including trans-Jubba, Gedo, Bakol and Hiiraan Regions, and even central Somalia in extreme circumstances.

These patterns of use must be accommodated in rangeland management proposals for the area and will affect the type of consultative user-association that can be formed.

A prerequisite for this planning would be the identification and mapping of the major riverine rangelands, the characterisation of the vegetation types, flooding patterns, patterns of use by locally resident and visiting stock, and identification and contact with users and their representatives.

In the lower Shabeelle south bank rangelands, the potentially most important riverine rangelands occur around the Labaajo swamp from Arbwoheerow to Soblaale, around the Heero and other drainage courses towards the Biliq Roboow area south of Haaway, the narrow flood plain rangelands downstream of Biliq Roboow through Far Saarey to Guudo Ferry at the confluence of the Weynle and Shabeelle, and the rangelands associated with the lower Shabeelle swamps at Madax Maroodi, Jirfa, Bafley and Biliq Tale.

For each area, the constraints and possibilities for development could then be considered and appropriate management procedures devised. An important element in this would be the maintenance of the present pattern of use of these rangelands mainly in the dry season, allowing the wet season for recovery and allowing the accumulation of a reserve of forage. Many of these rangelands appear to be in good condition at present, though this requires confirmation and monitoring at more sites than presently established. Some areas with a recent history of rapid bush and thicket development may also require remedial action, though burning is unlikely to be a suitable technique in some of the seasonally flooded areas.

Riverine rangelands would then require some system of protection and closure in rainy seasons (or access by a limited number of local stock only) to be agreed with all regular users, with the flexibility to accommodate occasional very large influxes of additional animals in droughts. Such a management system may only be evolved over a

considerable time period with a great deal of effort in establishing user-associations and participation. The experiences of the CRDP will be of great relevance to these approaches.

For the major rangelands in the clay/alluvial plains and the dunelands, different management procedures will be required. These have yet to be fully defined and tested in Somali conditions but are likely to include the use of fire, control of water supplies and deferred grazing. In the clay and alluvial plains, the immediate objectives of range improvement would be to control the increase in woody species and to reopen the bushlands and shrublands towards shrubbed and bushed grasslands. The principal means of achieving this is thought to be the periodic use of fire. The application of this technique requires, however, that grazing can be controlled or eliminated in blocks of rangeland in order to accumulate sufficient fuel from the grass and herbage layer to burn the woody vegetation. The technique thus requires the cooperation of range users and considerable efforts will be needed to establish sufficient contact with and involvement of users to ensure cooperation.

Trials of burning methods are required in different types of bushland, but in the relatively high rainfall coastal areas it is possible that a single burn at the end of the jilaal dry season may be sufficient after a 1 year closure to reduce the woody vegetation significantly. The required frequency of good burns is equally unknown but might be once in 5 or 6 years. In lower rainfall and dense bushland areas it is possible that a 2 year closure might be needed and 2 successive burns for a significant effect.

In the dunelands, the appropriate management techniques may involve only resting or deferred grazing. Bush encroachment does not appear to be a problem but maintenance of ground cover by herbs and grasses may be. This technique would require the same degree of commitment from rangeland users.

In the longer term future, the management of rangelands, if they are to be preserved, and if they are to remain open to communal use, must

involve some control of stocking densities or the provision of alternative forages. At present, if some degree of management could be introduced, there is scope for a small increase in livestock populations in parts of the area. It will be necessary, however, to devise systems of controlling stock numbers in the future, particularly if settlement in the area brings a substantial increase in rainy season use of the rangelands by locally resident stock.

The use of water resources to control access to rangelands may be of less relevance in the south bank rangelands than on the north bank. Permanent water resources are relatively accessible and abundant at present in the beach wells and the river. It may be desirable, though, to develop additional boreholes in the clay plains in order to reduce the amount of trekking to beach wells over fragile duneland areas, and to allow greater access to clay plains grazing. The latter developments, however, should only be considered when agreed management plans have been adopted for the areas.

The development of an organisational framework for the implementation of these range development procedures will be the task of the investigation and planning phase of the programme. Text Map 6 illustrates a possible approach.

The area will need to be divided into management units within which management and rehabilitation techniques can be sequentially applied.

In an area of variable climate and range resources it is not possible to make rigid plans for the timing and duration of these operations. These issues must be decided in the field by experienced technical personnel. In the case of the south bank rangelands the existing network of roads and geological survey cut-lines make a convenient basis on which to subdivide the area. With some additional clearing and cutting, these cut-lines could form the framework for a system of fire breaks and rangeland access roads. Additional fire breaks would be required to

protect the riverine rangeland reserves on the inland edge of the clay plains, and to protect the dune rangelands on the coastal edge.

As an indication of operational procedures it might be envisaged that the management units or blocks so formed (blocks S1 to S11 on Text Map 6) would be divided into 2 groups (for example S1 to S5 in the southern group and S6 to S11 in a northern group). Within each of these 2 groups, management and improvement techniques would be applied sequentially from one block to the next, returning to repeat the sequence continuously. Thus, in the southern group, block S1 might be selected initially, and in the northern group block S6. The dunelands in these blocks would be rested during the rainy seasons for a year. The clay plain rangelands would be rested continuously for a year, from one jilaal to the next, before burning (if sufficient fuel had accumulated). If successful, treatments and closures would be applied to the subsequent blocks in successive years, but could be repeated in individual blocks if necessary.

Clearly such a management system could only be introduced after a lengthy period of consultation and the establishment of local rangeland user-associations. Problems of policing and implementation to accommodate the needs of other range-users would be considerable. Incorporation of charcoaling, and fuel or building timber cutting and salvage would be required, and the protection of certain areas would be necessary. The application of such management systems would thus require detailed coordinated planning, beyond the capability of present regional and district administrations. It will be necessary for the investigation and planning phases of the programmes to ascertain the feasibility of such methods.

8.5.2 Lower Shabeelle North Bank Rangelands

These rangelands are illustrated in Text Map 6, as far as the inland limits of the marine clay and alluvial plains. In practice, management

of these areas should also include the colluvial slope rangelands of LR 6 and the southern edge of the Basement peneplain LR 8. These areas are described in NTTCP/LUS (1985), where the rangeland resources and patterns of use of grazing land are discussed. The area mapped in Text Map 6 covers approximately 250 kms of riverine rangelands and extends an average 75 km inland from the river, an area of about 19 000 km².

8.5.2.2 Rangeland resources and land use

The land resources of the area are comprised of the narrow alluvial plains close to the river, and the marine clay plains extending away from the river. The area comprises LUS Land Region 2, as described in NTTCP/LUS (1985). The rangelands include the tsetse infested riverine and swamp fringe rangelands, including some very heavily used seasonally flooded grasslands, and the relatively uniform shrublands and bushlands of the marine clay plains.

There is very little settlement in the area. Settlement is extending downstream of Qoryooley on the north bank of the river, though remaining close to the river. Rainfall declines sharply inland of the river as the effect of the coastal haggai rains is lost. In much of the remainder of the area the only settlement is associated with the large Government wars (water tanks), but this involves only very few people. Some opportunistic cropping occurs occasionally around nomadic settlements in the clay plains but the areas involved are small and settlement is not permanent. A very small area of settlement exists on the northern side of the lower Shabeelle swamps, in the Caanoway area.

The major use of the area is for rangeland. The patterns of seasonal movements of stock in the area are described in NTTCP/LUS (1985). Briefly, the marine clay plains are used mainly by cattle during the rains. These cattle are mostly from the intensively settled areas around Qoryooley to Jannaale and return to these home areas for crop residue feeding in the dry seasons.

During the dry seasons, other stock (both cattle and camels) gradually move from the rainy season rangelands in the Basement and colluvial plains (LRs 8 and 6) into the clay plains and towards the river. After the heavier gu' rains, and in areas which receive a small amount of haggai rains, there may be sufficient water remaining in the wells which are dug in the drainage courses from the Basement plain, and in the Government wars, so that fewer stock have to travel to the north bank riverine rangelands. Also, many animals move south of the river through Kurtuunwaarey and Qoryooley for grazing in the south coastal plains, during haggai. The main season of use of the north bank riverine rangelands is thus the jilaal dry season. During this time cattle are intensively stocked near the river while camels remain more widely dispersed through the marine clay plains.

The stock watering resources of the area include the riverine and swamp drinking points, the Government wars, and the larger hars downstream of Haaway (Har Cadiiley, Har Casho, Har Boojo and Hara Naga; these are important water sources because of the relatively light tsetse infestation associated with them). Water sources are mapped on Map 6 in NTTCP/LUS (1985). Some natural ponds (balli) also occur in central and southern parts of the area and a few hand dug private wars are located mainly towards the middle Jubba river. Water is also seasonally available in the flashy drainage courses from the Basement and colluvial plains. Much of this water is lost to ground percolation before reaching the clay plains, or is spread widely at the plains. Wells are dug in the drainage course beds which can provide some water through much of the dry seasons. Towards the eastern end of the area, between the river and Buurhakaba, there is a relative paucity of water sources.

The marine clay plains have low potential for agricultural development, because of both poor soils and low rainfall. (Map 2 illustrates land capability of the area.) Small areas of Class 1 and 2 land exist on alluvial soils close to the river, and between the Togga Soblaale, Togga Suro and the river. Settlement is currently extending downstream into some of these soils around Arbowoheerow, Buulo Warbe and Alafuutow, and could expand much more extensively north of Garowle and Qoryooley in Class 2 soil areas.

The marine clay plain rangelands appear to be in moderate condition, though they are amongst those in which an increase of shrub and bush vegetation may have recently been occurring at the expense of grasslands, as described in NTTCP/LUS (1985). These changes in vegetation may be a response to overgrazing particularly by cattle in the rainy seasons. Overgrazing by cattle results in the removal of ground grass and herb vegetation, thereby reducing the fuel available for dry season fires to control bush encroachment. The condition and trend of these areas requires further study.

In the riverine rangelands, only a few sites for monitoring range condition have yet been established, but these appear to be in satisfactory condition, especially where used only in the dry seasons. The north bank rangelands include some of the most heavily stocked dry season grasslands in southern Somalia, between the Togga Soblaale, Togga Suro and the Shabeelle from Arbowoheerow downstream to Haaway. These are partially flooded in the rainy and river flood seasons, which presently denies access for settlement and cultivation and for rainy season grazing. Other important riverine dry season grazing areas are the bushland rangelands around the north bank hars, and in the lower Shabeelle swamps around Laffo Garri, Daad Jerow, Baar Madax and Balli Weyne. Greater water abstraction for upstream irrigation, or programmes of swamp drainage, could greatly affect these rangeland resources.

8.5.2.2 Range development proposals

The types of investigations and planning required for the formulation of a rangeland and land use plan for the area are detailed in Section 8.4. The particular priority requirements for the north bank rangelands would also include the following:

1. Identification of major riverine rangelands for use in dry seasons and droughts. Accommodation of agricultural development.

2. Development of range management techniques for the principal rangeland types (initially the bushlands of the marine clay plains).

3. Water development.

4. Establishing contacts and institutions for representation of seasonal nomadic rangeland users.

5. Organisation of overall range management programmes.

The identification of major riverine rangelands, and the careful study of present patterns of land-use, and of the constraints and opportunities for agricultural development, is particularly important for the north bank rangelands. In the south bank rangelands, settlement is possible and preferred on Class 1 and 2 soils in high rainfall areas away from the river, thus relieving the pressure on riverine rangelands. In the north bank rangelands, however, the only areas suitable for settlement and agricultural development are the riverine rangelands, particularly those from Arbowaheerow downstream to Haaway. Since these rangelands are vital to the present seasonal grazing system, it will be particularly important to consider the implications of agricultural development and to make plans for reservation of substantial areas of these rangelands.

The range management techniques for use in the north bank rangelands are not yet defined. As with the south bank rangelands, trials are required to develop the most appropriate combination of methods. In the north bank rangelands, the most likely techniques will include burning, deferred grazing and the control of water supplies. The use of fire to control bush encroachment in the marine clay plains requires the control of stock movements, and so can only be applied with agreement of range users. For riverine rangelands, the prevention or control of rainy season grazing will be required, to preserve forage for dry seasons and droughts.

The use of water supplies to control the use of rangelands may also be feasible in the north bank rangelands. While water sources are relatively abundant in the south bank rangelands, there are relatively few major water sources in the north bank rangelands and most of these are Government controlled surface water reservoirs. Text Map 6 shows the locations of the existing large wars, the approximate possible locations of additional wars required in the poorly watered north-eastern end of the project area. A further area requiring some development of water resources is to the west of the Haaway to Yaaq Braawe road, where 2 additional wars are proposed. Investment in such facilities would be substantial, though, and should not be contemplated without detailed feasibility studies. Wars of only 5 000-10 000 mcm capacity might be more appropriate than the present 20 000-30 000 mcm sizes.

The methods by which these water sources might be used to control access to rangelands will also require careful planning, in cooperation with present users. The development of water sources can have detrimental effects on nearby rangelands unless undertaken as part of an overall management programme.

A further aspect of water resource development that merits consideration is the possibility for water spreading from the flash river courses draining from the Basement plains. A pilot trials programme to investigate this possibility, and to search for suitable sites, could be a separate component of the range development programme. The objectives would be to improve rangeland primary vegetation productivity in the areas receiving water.

The development of an organisational framework for the management of the north bank rangelands may be more complex than for the south bank. Significant problems include the large size of the area, and the lack of access, communications and Government infrastructure. The only major road through the area is the Haaway to Yaaq Braawe road, though the

Haaway bridge is presently closed to most traffic. Access is therefore restricted to remnant geological survey cut lines from either Qoryooley or Jilib.

A further problem may be in the contacting of groups of rangeland users and the formation of associations of users to agree management plans. The north bank rangelands are used by many groups of people from diverse origins and in different seasons of the year. There are relatively few settled local permanent users of the land. Water points and riverine grazing lands may be the best points of contact with users but considerable efforts by sociologists and extension workers will be necessary to develop sufficiently representative and functional associations of users.

As with the south bank rangelands, the northern rangelands will require subdivision into units within which rehabilitation and management can be sequentially applied. The organisation of such plans must await the investigatory and planning phases of the programme, but Text Map 6 illustrates a possible framework. The whole area may require division into 2 or 3 project organisational areas. Within these, the rangelands may be divided into management blocks, including riverine rangeland blocks (blocks R1 to R14, from Biliq Tale at the downstream end to Aw Dheegle at the upstream), and the non-riverine blocks (blocks N1 to N28). Rangeland improvement techniques could then be applied as necessary for each type of block, as described for the south bank rangelands.

8.5.3 Middle Shabeelle Rangelands

The middle Shabeelle rangelands area to be discussed in this section includes Jawhar and Balcad Districts and some parts of Wanlaweyn District, as illustrated in Text Map 7. This area represents many of the problems to be encountered in the management of rangelands in the more developed parts of the Shabeelle and Jubba valleys.

8.5.3.1 Rangeland resources and land use

The range resources, livestock populations and the patterns of seasonal movements of livestock in these areas have been discussed in NTTCP/LUS (1985) and in the Southern Rangelands Surveys (Watson and Nimmo, 1985). Text Map 7 shows the principal features of land-use in the area, including the land now in the cultivation cycle and the remaining areas of rangeland. Additional small areas of rangeland, too small to map at 1:500 000 scale, also remain close to the river. The major riverine rangelands are described in NTTCP/LUS (1985) (see Section 9.4).

Text Map 7 also shows the land capability classification for the area. Agricultural development has largely occurred in Class 1 and 2 alluvial soils in the river valley and flood plain, stretching in a band from Ceel Baraf in the north east to Wanlaweyn District to the south west. Within this area (which roughly corresponds to LUS Land Region 4 described in NTTCP/LUS, 1985), agricultural development includes control gravity irrigated and flood irrigated land close to the river and rainfed farming away from the river. Settlement is relatively intense in both irrigated and rainfed areas and there are indications of environmental and soil degradation in the most intensively settled rainfed areas.

The north-western and south-eastern boundaries of present cultivation approximately correspond to the limits of cultivable soils. Only small areas are cultivated outside these limits. The remaining bushlands within the cultivable Class 1 and 2 soils of the alluvial flood plain will therefore be under pressure for development in the future.

A large livestock population uses the area, as described in NTTCP/LUS (1985). In both rainy and dry seasons, the area has high seasonal stocking densities. Most settled Somali farmers in the area own some livestock, mainly cattle and a few small stock. These animals graze in nearby rangelands in the rainy seasons, particularly Buurhakaba and north of Qoryooley, as well as in the coastal rangelands during haggai. A proportion of the herd, however, (comprised of some milking and young

animals), remains in the farmland areas in the rainy season using local remaining bushlands, fallow grazing and crop residues. These animals constitute a significant rainy season grazing biomass.

Animals owned by settled farmers return to the farmlands during the dry seasons to make use of crop residues, before moving to dry season riverine grazing areas if necessary. Also in the dry season, animals from other areas come to make use of the same crop residue and riverine grazing resources so that the livestock biomass is considerably increased. However, much of the area cannot support large dry season livestock populations for the duration of the dry seasons so animals have to move on to the remaining important seasonally flooded riverine rangelands in the area and to other similar rangelands in the lower Shabeelle. It is a characteristic of the middle Shabeelle area that animals pass through from the north and west towards the south and downstream in both dry seasons.

The major remaining riverine rangelands are those to the south of Afgooye Cadde, with additional small remnants from Afgooye Cadde downstream towards Mahaddayweyne, and the Xawaadley area, where the Xawaadley offstream storage reservoir and associated neighbouring swamps provide important grazing resources. Most other bushlands in the area are dryland rangelands with little consumable vegetation available in the dry seasons, except when exceptional river flooding spreads water to them. This may occur in the rangelands to the west of Duduble and Xawaadley, though the frequency of such flooding may be decreased if the Duduble offstream storage reservoir is completed.

While much of the riverine rangelands have been taken for agricultural development, the river remains an important source of drinking water for livestock. Text Map 7 illustrates the main river watering points as well as the distribution of other major water sources in the area, with the exception of the numerous hand dug wars in the settled rainfed areas in the Wanlaweyne and Caadley areas. Access for livestock to the riverine drinking points through the cultivated lands remains necessary

but has become more difficult in some areas as agricultural development has proceeded.

Finally, Text Map 7 shows the approximate locations of the grazing reserves currently operated by the NRA in the area. These reserves are operated by Regional and District NRA offices, with the intention of ensuring their closure during the rains to provide a dry season reserve. Although they are staffed by NRA staff and guards, they are not effectively maintained and have no infrastructure development with which to promote management of the rangelands. They are not sited within the framework of a range development policy for the area and do not cover particularly important dry season grazing areas.

8.5.3.2 Range development proposals

The degree of land development in the area, and the likelihood of further development as human population pressure increases, have raised a number of problems in the management of land and rangelands in the area. These include:

1. the reduction of riverine dry season rangelands
2. the increase in rainy season livestock stocking densities on remaining rangelands
3. the maintenance of access to river watering points
4. increased damage to crops, canals, and field bunds caused by livestock.

On the other hand, various aspects of integration of livestock with crop farming have developed in the area, principally the trading and use of crop residues, irrigated fallow grasslands and cut grasses and weeds. The interrelationships between visiting livestock owners and local farmers have also resulted in various arrangements to allow the herding

of farmer-owned animals by pastoralists. These aspects of integration are to the mutual advantage of both pastoralists and settled farmers and should be encouraged in any future land management plans.

The preparation of rangeland development plans for the area must address the problems described above, within the framework outlined in Section 8.4. In a complex area, further detailed study of range resources and their use, and efforts to contact and involve the various groups of land users, are vital to the preparation of workable plans. A phased approach is therefore necessary. The following sections present some preliminary ideas for approaches to the main problems.

The reduction in riverine rangelands has changed the nature of dry season forage resources. It is likely that intensively irrigated riverine agricultural land may produce at least as much forage dry matter as the former riverine rangelands. Much of the forage, however, is in the form of low quality crop residues, compared to relatively higher quality browse and grazing. The availability of some high quality green forage, as for example from irrigated fallow grasslands and canal bank grazing is therefore very important to provide a more balanced forage resource and to allow more efficient use of the crop residues. The remaining riverine rangelands, especially those that are seasonally flooded, also provide a relatively high quality forage resource. Future plans for the area should include the development, dissemination and encouragement of the use of forage crops within both irrigated and rainfed farming systems, as described in Chapter 7, and should make a close study of the remaining riverine rangelands, with a view to the preservation of the most important of them. The use of the Xawaadley offstream storage area and neighbouring seasonally flooded lands, and the areas which are to receive excess flood waters via the Duduble flood relief channel should also be examined, and incorporated into managed dry season grazing reserves.

The continued increase of human populations and settlement in the area, with the associated increase in livestock populations, may have a number of undesirable consequences. Firstly, as settlement increases, the

available cultivable land per person will decline and fallow periods will be reduced. Soil fertility and available moisture may then decline and fallow bushland regeneration is reduced or eliminated, with possibly serious consequences for soil erosion and crop yields. As livestock populations in the area increase, the remaining rangelands come under increasing pressure from grazing and browsing in both rainy and dry seasons, also leading to gradual degradation. Fuel wood and charcoal production may exacerbate this process.

There is urgent need to examine the farming systems in the rainfed farming areas of Wanlaweyne and Jawhar Districts, to assess the degree to which these trends are evident. It would be desirable to devise some means of rehabilitating some of these areas with tree, forage hedge, village fuelwood plot and windbreak planting, and with changes to the farming system if practicable.

In the remaining rangelands it will be necessary to study condition and trend, and to investigate techniques for improvement of the vegetation. In such heavily used areas it will be difficult to close parts of the range for management without increasing pressures on the rest of the range. A possible approach may be through the villages in which rangelands lie. Small schemes coordinated between neighbouring contiguous villages might be possible, especially if combined with tree and forage shrub planting programmes. Land-use could be planned and improved at village level to maintain a certain proportion of land in rangeland and to encourage improved farming practices and fallow rotations on the cultivated areas.

Access to river water drinking points remains necessary for resident and visiting stock. It is suggested that all major river drinking points be identified and access to them be improved and bush fenced if necessary, especially in the more intensively irrigated areas. This measure alone would do much to reduce crop and canal bank damage. It may also be necessary in certain areas to provide stock routes along which animals can pass through cropped land to riverine grazing areas. At the same time animals will continue to need access to irrigated fallow areas for

grazing, and attempts should be made to promote this type of integration. The high commercial value of such grazing at present will encourage such developments, and the use of specialist forage catch crops or undersown crops should also be examined.

The organisation and management of such combined rangeland and land management schemes would best be coordinated at regional and district levels. Planning and management will require the involvement of several departments of Government, including the MOA, MLFR, NRA and the Ministry of Local Government and Rural Development. Mechanisms for the involvement of these departments must be evolved during the initial investigatory and planning phases for rangeland development in the area.

8.6 WILDLIFE CONSERVATION

Conservation of the environment is a concept of vital importance to Somalia, located, as the country is, in a region of extreme ecological fragility. The threat of greatly extended desertification is constantly present and there is also an intrinsic need for conservation of representative ecosystems if only for educational and recreational purposes.

Within the Shabeelle Valley, the riverine forests and the swamps are habitats/ecosystems which are rapidly disappearing in the face of agricultural development. Very little of the forests now remain. ←
Hopefully, the new nature reserve at Balcad will conserve a small representative stretch of Shabeelle forest. The swamps, as yet, are intact, ← but likely to be modified by agricultural development particularly around the upstream swamps at Idow Guudow and Labaajo.

In the past, a number of sites in the Shabeelle Valley have been proposed for National Parks and Wildlife Reserves (as mapped in preliminary reports of the NTTCP/LUS, Errington, 1983). Many of these areas have now been partially settled and developed, and are no longer

suitable areas for preservation. In the lower Shabeelle, preservation areas were proposed for the Jilaal Moogi swamp area south of Aw Dheegle, the Labaajo swamp downstream of Arbowoheerow and the lower Shabeelle swamps downstream of Har Boojo. While preservation of parts of the two upstream swamps would still be possible, cropland development and settlement is already occurring, and these areas are under increasing pressure for further development. Control of the river and irrigation development in the middle Shabeelle is also already affecting the flows of water into upstream swamps and could soon alter their character. If it is intended to preserve any riverine swamplands, therefore, it is recommended that an area of the lower Shabeelle swamps be selected. This area is currently under least pressure from settlement and has a water regime which is partially independent of irrigation developments in the middle Shabeelle.

The area proposed for preservation lies downstream of Har Boojo, including the Weynle and Shabeelle River confluence, and extending downstream to cover the Madax Maroodi, Baar Madax and Balli Weyne swamps as far as Biliq Tale, as shown in Text Map 6. The area could be restricted to encompass only swamplands or extended to include swamp fringe bushlands and thickets. The area offers the last realistic possibility for preservation of a large swamp ecosystem in Somalia.

It is therefore recommended that a detailed study of the area be undertaken with a view to establishing the desirability and practicality of preservation, to determine the type of preservation (National Park, Wildlife Reserve, Conservation Area), and to prepare appropriate management plans and controls on human activity. Such a study would require a wildlife ecologist and land-use planner for 1-2 months, with necessary support. Costs of the feasibility study would amount to about US\$20 000.

CHAPTER 9 RECOMMENDATIONS FOR DEVELOPMENT PLANNING AND COORDINATION

It is beyond question that a considerable potential for development exists in the Shabeelle Valley. Already, the paramount importance of this area for Somalia can be seen in the simple statistic that about half of all the grain crops produced in Somalia derive from this single valley. To realise more of this potential requires that the development process be better planned and better coordinated. 

Implementation of a desirable rural development strategy in turn demands the resolution of a number of key issues. Chief among these are technical aspects, such as the need to plan the use of water for all purposes over the Shabeelle Valley as a whole (Chapter 6) and the need to develop viable farming systems based on both crops and livestock (Chapter 7); but, above all, the simultaneous evolution of mechanisms for determining land use priorities within a coherent framework of planning at the centre, allied with a greater measure of local participation in decision-making and the implementation of more development emanating from the district level, not least to ease the burden and congestion of central direction. 

Much advice has already been proffered to government; all no doubt well intentioned, mostly expert, some contradictory. Volumes of reports lie stacked in ministries. That these volumes remain unread by (and often unknown to) the narrow upper echelon of officialdom, is a fact that should be no cause for surprise. It is that very lack of broad-based technical expertise at all levels that is so often the subject of these reports, that detracts from the prodigious efforts of the few highly competent officials on whose shoulders falls the entire burden of managing the Somali economy.

Rather than produce yet more unwanted admonitions therefore, it has been thought more useful for this final chapter to highlight certain key recommendations that have already been the subject of earlier reports relating to land use in the Shabeelle Valley, but have yet to be implemented.

9.1 DOCUMENTATION CENTRE

An important prerequisite of coordinated planning is up-to-date knowledge of the activities and plans of all ministries and agencies concerned with aspects of development. A major recommendation is therefore for the establishment of a single documentation centre and library staffed by a qualified librarian. In this centre would be lodged copies of all reports, maps, surveys, proposals and other developmental information. This should at least avoid duplication of effort, whether by government departments or by consultants, but should also provide an overview of surveys and other investigations undertaken to date. Particular emphasis should be given to provision of an associated map office within which copies of all maps, aerial and satellite photographs should be stored under suitable conditions. It would also be valuable for ministries, especially the Ministry of Agriculture, to prepare maps showing the locations and extent of existing surveys.

The most appropriate location for such a documentation centre would be the MNP, based on the existing MNP library. Specialist documentation centres should also be maintained in other ministries and agencies.

9.2 LAND USE PLANNING IN THE SHABEELLE VALLEY

Emphasis has been given in this, and other, reports to the need to look at the Valley as a whole rather than as a series of 'ad hoc' projects. Water resources are limiting, funds are short and technical staff are chronically short supply. Priorities have therefore to be established but this can only be achieved on the basis of a total knowledge of each resource and its potential. Various prospective donors are in process of responding to this need; GTZ has advanced a proposal for preparation of a 'Shabeelle Master Plan' in relation to water use (mentioned in Chapter 6); USAID is considering undertaking a soil survey of at least a portion of the valley; ODA is to fund (Jan 1985-June 1986) a second phase of the Hydrometry Project - Shabeelle and Jubba Valleys. These

activities underline the need for a total updating of the pioneering efforts of HTS and MMP (1969) in respect of the overall management of the waters of the Shabeelle River.

9.2.1 Land Resources

There is particular need to intensify the soil/landform survey of FAO/Lockwood (1967). Although individual map sheets were produced at a scale of 1:60 000 (76 sheets in all, covering much of southern Somalia), the intensity of survey then undertaken was not in fact sufficient to justify map production at that scale and most recent resource reviews have been based on the reconnaissance soils map also produced at that time at 1:500 000. Although subsequently reproduced in part or in whole in many reports (including this one, where it has been reinterpreted for land capability evaluation - Sheets 2a and 2b), it cannot be too strongly emphasised that this scale is wholly inadequate for detailed planning and design.

Semi-detailed soil map

What is required is a separate project solely devoted to producing a semi-detailed soil map of the entire Shabeelle Valley. From this, specific areas could be chosen for more detailed assessment.

An ideal scale for this soil mapping would be 1:50 000, based on photo-interpretation of the 1983-4 NTTCP airphotos. This would however require an input of about 30 man-years. Instead, a reasonable compromise would be to map the valley at 1:100 000, using the Russian base maps and requiring only 11 man-years (e.g. a 3-year project with 4 soil surveyors).

Topographic survey

Nor are soils the only topic upon which detailed information is lacking. The existing 1:100 000 scale maps show spot levels at 2-3 km intervals, and contours at 10 m vertical interval. This is wholly inadequate detail for planning the use of land (including irrigation) on such relatively level surfaces as exist on the Shabeelle floodplain. The scale and survey intensity required will depend on project objectives. A one metre contour interval would provide the minimum of detail necessary for irrigation and drainage designs; on some schemes a 0.5 m interval may prove essential. Initially, bench marks will need to be established on some of the prospective development sites described in Chapter 6 to enable the level to be determined quickly in support of any hydrometric or topographic work (possible problems with the datum level are reviewed in Annex 3). An early input at most sites will be trace cutting to provide access for the field parties and sight lines for the surveyors.

An example of possible survey workload is shown below for a typical 12 000 ha area of the lower Shabeelle (MMP, 1983).

Main axis trace running through the centre of the area	25 km
Additional traces at 4 km interval at right angles to the main axis	60 km
Embankment axis	15 km
Additional traces at right angles to the embankment axis	10 km
Trace access to structure sites	10 km
TOTAL	120 km

Assuming that the bush density allows an average machine trace cutting rate of 3 km/day (in riverine thicket the rate may actually be down to 1.5 km/day), 40 machine-days would be required. Present hire rates may be as high as 6 000 SoSh/machine day. Topographic levelling teams should achieve 6 km/day for the 240 km to be levelled; therefore 40 working days will be required, plus double levelling to link the survey to a national bench mark. Supervision of the trace cutting is necessary and permanent bench marks should be established. An effective combination would be 2 surveyors and 2 bulldozers for about one month.

Registration of land holdings

Greater priority also needs to be given to the drive to register land holdings. An important related activity is the preparation of maps of farm boundaries; this implies a need to develop a section of government concerned with cadastral survey, which in turn implies a need for funding and further training to be directed towards the Department of Land and Water in the Ministry of Agriculture.

Land Resource Survey Unit

Given these urgent requirements for land resource surveying - of soils, topography and farm boundaries - and not just in the Shabeelle Valley but nationwide, at least two proposals have been put to the Ministry of Agriculture for a 'Land Resource Survey Unit', to be attached to the Department of Land and Water (FAO, 1981; 1984). The basic aim of such a unit should be to provide the data necessary for defining priorities and planning for land development. As such, it would need to be accorded the status necessary to be able effectively to adjudicate between the conflicting land claims of organisations such as the Ministries of Agriculture, Livestock, Forestry and Range, Local Government, the National Range Agency and local Regional Commissioners. To be independent of all ministries (that is, with autonomous status) might leave the Unit with no powers whatever and so it is recommended that it

be maintained within the Ministry of Agriculture but with funding and staffing commensurate with its major role, providing a service to all organisations involved in the use of land.

The five immediate objectives of this multidisciplinary Unit, as set out in one of the proposals (FAO, 1981) would be to:-

- Develop the existing soil analysis facilities at the Agricultural Research Institute, Afgooye
- Implement systematic soil surveys at reconnaissance level according to development priorities
- Develop a data bank of information on soil characteristics and analyses
- Provide a Project Studies Service staffed by trained soil scientists to undertake studies as required for development projects
- Train technical and field staff in land evaluation methods.

Investment in soil laboratory equipment and in training for soil chemists and laboratory technicians is clearly a key component of this proposal, and has also been identified by ISNAR in their recent review (1984) of Somali agricultural research facilities. The two FAO proposals for some form of soil survey/land evaluation unit are similar in outline, but the later proposal is for \$1.1 million less than the earlier one, largely as a consequence of a projected \$0.8 million saving in personnel costs. This is considered to be a false saving and it is to be hoped that sympathetic consideration be given to the full 1981 budget of \$2.63 million. The present status of these proposals is unknown. Considerable coordination will be required between the Somali Government and the prospective donors in order to launch this important proposal under the most favourable circumstances.

Clearly, there is no point in the NTTCP/LUS advancing yet another proposal, possibly to confuse what may already be a fairly complicated situation, but we would make the following technical comments on the 1984 proposals:-

1. Rather than undertaking several rather general (1:250 000) reconnaissance-level studies, it is urged that the 'Land Resource Survey Unit' be associated from the outset with a major study of national urgency. The most appropriate objective of national significance would be an integrated land resource study of the Shabeelle Valley. Staffing and the provision of facilities would, in that event, have to be coordinated between the UNDP and USAID.
2. Provision of a functioning and fully staffed soils laboratory is a sine qua non. This will again necessitate coordination between UNDP and USAID. In view of the key role of soil moisture in crop production, considerable weight needs to be given to soil physical determinations both in the field and in the laboratory.
3. Little consideration has been given to necessary cartographic support for the Department of Land and Water. Yet this is essential, both for field topographic and cadastral survey, and for necessary back-up (in terms of base and thematic map production) for the soil and land capability surveys. Current map production and provision is centred in the Department of Military Surveys. No doubt the military have need of a separate survey section, but it is suggested that a new civilian organisation be established within the Ministry of Agriculture to be known as the 'Survey of Somalia' having close connections with the Department of Land and Water. This would require, over and above the minor provision made in the two FAO proposals, \$150 000 for standard cartographic equipment, light tables, plotters etc., plus 24 man-months of additional expatriate cartographic support (say \$170 000), i.e. \$320 000 in all.

4. Since there is at present no organisation equivalent to the proposed 'Land Resource Survey Unit', considerable provision will need to be made in the early days for training, both on-the-job and overseas. Once expertise has been built up within the country, Somalia will become less dependent on the present constant stream of consultants.

9.2.2 Water Resources and Meteorology

Hydrometry Unit

Somalia has been endowed with a hydrological record on the Shabeelle which is more impressive in its longevity than its reliability. Over many years these data have been adjusted and recomputed so that it is often difficult to know how to treat those records that do exist; there are also many gaps. ODA is funding a Hydrometry Project currently extended into a second phase, to June 1986. This seeks to assemble and computerise all hydrological data, upgrade the network of staff gauges and install automatic water level recorders at Beledweyne and Kurtunwaarey. We would support the permanent establishment of a Hydrometry Unit as an integral part of a greatly expanded Department of Land and Water Use. Such a Unit is likely to need external assistance for the foreseeable future, together with significant funding for training Somali staff. Active coordination should be promoted with the Hydrological Section of the Water Development Agency, with the Ministry of Minerals and Water Resources and with the Ministry for Jubba Valley Development.

Little attention has been paid in the past to the hydrology of the Shabeelle. It is proposed that six hydrometric stations be established on the Shabeelle and one on the Togga Suro/Soblaale. Only the more inaccessible sites require automation; otherwise twice-daily staff gauge readings will be sufficient; these gauges should be related to a common datum to facilitate comparisons. The gauge locations have mostly been selected for ease of access; an access track will however be needed on

the Shabeelle north bank leading from Haaway to the Togga. The following gauging sites are recommended:-

River, km 1 : downstream at Farkeerow Barrage

57 : upstream of the main swamp near Arbowoheerow

125 : at Soblaale

148 : on the Baraawe/Diinsoor road bridge at Haaway

241 : at Guudu Ferry (Autographic option)

338 : on the new Jilib/Muqdisho road bridge

It is further proposed that a staff gauge be installed on the Togga Soblaale upstream of Haaway. It may be noted that the alternative of an autographic installation (comprising float well with instrument housing and a 4½-month duration automatic water level recorder) would cost at least \$3 000 per site. However, the relative reliability of automatic instrumentation could prove a decisive advantage in determining the type of equipment to install. The double levelling programme for the seven sites recommended would involve only 16 km of trace cutting as the sites have been chosen for their relative accessibility. The total distance to be levelled, to the new Muqdisho-Jilib road (where it is assumed that the new road bench marks are available), is about 200 km; this would take one surveyor one month plus trace cutting and camp establishment time. Each gauge should be read twice-daily by paid observers and periodic (say monthly) measurements of river flows should be made to establish and maintain a rating curve for each site. Since no cableway construction is envisaged, the basic materials required for each site would only cost about \$200. The major commitments relate to staff - training, positioning, supervision and maintenance - and to the provision of back-up transport for regular monitoring and flow measurement.

Meteorological recording

So far as meteorological measurements are concerned, the Ministry of Agriculture has now (1984) established 13 stations within and in close

proximity to the Shabeelle Valley; these stations are at least equipped with rain gauges, though not all are operating at the same level of efficiency. These stations are (1984) sited at Afgooye, Balcad, Beledweyne, Jannaale, Jamaame, Jawhar, Jilib, Lafoole, Muqdisho, Qoryooley, Soblaale, Wanlaweyn and War Maxaan. Studying these records it was evident that there are still far too many gaps and also too much misrecording. It is in Somalia's long term interest to invest an appreciably greater effort in collecting these data upon which the agricultural future will be planned. Before any attempt is made further to expand the existing network of recording stations, every endeavour should be directed towards getting the existing stations functioning properly; top priority will need to be devoted to training, retaining and supervising the local observers upon whom the effectiveness of the system wholly depends.

Once the network is operating reliably, there is a case for extending the recording of wind run and evaporation. To this end, it is recommended that recording anemometers (2 m above ground level) and Class 'A' evaporation pans be installed at as many as possible of the stations listed above, but especially at Jawhar, Afgooye, Jannaale or Qoryooley, and Jilib/Alessandra. It may be noted that the Settlement Development Agency (SDA) maintains climatological recording stations at Kurtunwaarey and Soblaale, which could with advantage be integrated with the national network. Although the areal coverage of the existing network is quite adequate, it would be valuable eventually to have additional rain gauges at Buulobarde, Jalalaqsi and Mahaddayweyne. The first priority should, however, be the installation of a complete climatological-recording station (rainfall, temperature, sunshine, evaporation and wind run) at Haaway, a key site for range development and irrigation planning on the lower Shabeelle.

