Ministry of Agriculture & Irrigation

DRY LAND POLICIES UNIT

ARID LANDS MANAGEMENT IN THE SUDAN

Experiences and lessons from implemented projects and map-work review

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TABLE OF CONTENTS

LIST OF PROJECTS REVIEWED:

PROJECT	YEAR		cost
Land and water use survey	1962/67	FAO	
Savannah Development Project	1969/72	FAO	
Southern Darfur Land use planning	1972/74	ODM	
Savannah Development Phase II	1974/76	Co-financed	
Nuba Mountains	1976		
Mechanised Farming	1976	German Funding	
Land use planning Survey	1977	ODA	
Modernisation of Trad. Agri.	1977	French Funding	
Re- Survey, Nuba Mts., AACM	1980's	World Bank	
Abyei Special Project (Harvard)	1977	USAID	
Mechanised Farming	1970's	World Bank	
Jebel Marra Project	1958/69	FAO/Ministry of Agriculture	
Jebel Marra project	1979/72	Tesco/Yugoslavia	
Savannah Dev. Phase I &II	1980/1994	Consortium IDA,ODA, IFAD	
ADS	1985	IFAD	
AnNahud credit project		IFAD	
Northern Region Irrigation Rehab.		IFAD	
Southern Roseiris Agric. Project		1-World Bank..... 2-IFAD	
White Nile Irrigation Rehab. Project		IFAD	
El gash Rehab. Project.			
North Kordofan Rural Dev. Project			
South Kordofan Rural Dev. Project			
Ministry of Agriculture piloting			
Soil Conservation piloting			
Global Environmental projects			
New Halfa Rehab.			
Gezira Rehab.			

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PART ONE

EXECUTIVE SUMMARY

This executive summery incorporates salient policy issues in lessons learnt from projects highlighting concepts and areas of mismatch as well as successes within projects executive capacity.

Considering inclusion of land policy in the national policy it suggests a road map to address guiding policy concepts, technically and institutionally for a constructive policy dialogue.

For many, the relationship of land policy with the issues raised is not clear; land policy is more than land laws.

Rural livelihood and production parameters are modelled with respect to land policy synergies as a conclusion to lessons learning, it is not exhaustive but focussed on the main themes

In mapping a course of action is suggested for a dynamic generation of information so that policies can harbour on facts and not whims. The added benefit is expected in focussing policy tools towards joint accountability in addressing issues of livelihood in the rural economy as a substitute to the current excessive departmentalisation.

The work load for incorporating Arid Land Policy issues in National Policies should not be underestimated as it entails adjustments in more than one facet.

Land policy in constitutions is a starter next to citizen rights, whereas land in market economy in community ethics settled to private ownership; the situation in arid environments differs in capitalised on environmental management systems. The controversy arises when applying the specific conceptual frames of one onto the other. In this respect, projects are illustrations. Projects cost can go for billion Dollars but still desertification ,food insecurity poverty are worse today than a century ago.

The rationality of the case is evident, executives and politicians are to consider projects past cost and returns and perceive projects as financial disbursements at a cost to the Government, regardless of the source of finance.

The Arid Lands Policies Unit is expected to lead this endeavour, suggestions on who will do what are proposed.

(1)GENERAL

A) Overview

* There is a clear lack of sense of (having); projects are always Donors projects and not Government. Introduced as such widens the already existing gap between Government and citizens. With Regional authorities this distance was maintained.

The implications for projects are being isolated islands in their temporal context. Within the short time horizon of projects, risk of interference in projects mandate is a real threat. Hard as it may be, experience in project execution support this proposition.

*Projects are financial investments, subject to evaluation in terms of cost and returns, this issue is rarely raised, rendering projects as decorative instruments; there is no real inclusion in regional policies but projects are an external increment, against this background, sustainability of projects region wise is doubtful.

*Project selection and design that rests on an agreed upon economic scenario envisaged in Donors missions. The Sudan is a willing recipient subject to the terms and conditions of the lending agency; the perception of how to trigger the production processes is a main concern for Donors that lead to successive shifts of emphasis in projects operational theory. Adoption of expatriate blue prints was rarely questioned except very recently and in odd magnitudes but not a comprehensive whole.

* Two phases can be identified, the first stated after independence focussing on land related issues and the second, since 1985 emphasis was shifted to empowering communities. Phase one Projects are expatriate lead on contractual bases; the second type is mainly programmes centrally supervised with smaller out layers in regions, themes focus on selectivity and targeting

*Across the two phases, the evaluation of the major Donors settled to a conclusion that projects did not meet the grand objectives though successful within their internal mandate. The error source was identified as the non inclusion of land policy issues into the national policy. Internally, much weight was given to the project within the executive capacity; issues on sustainability, linkages the background concepts are likely to be flat.

*The (Donors) message provided the guidelines for projects review; looking at the (project conceptual framework), (inception), (objective), (design) and (interventions as tools).

Whereas it is mandated there is no problem with the internal tenure of the project; sources of errors earmarked by donors are confirmed be in the inception and the guiding concepts

*Tracking back this error source throughout the project progression and linkage with the project socio-environment reveals that dry lands are different from temperate lands, in terms of fixed and variable attributes, especially rain fall;

The implications of this difference are far reaching in economic theory. Dry lands operational criteria, rest on management rather than the maximisation principle; the only except is where irrigation is secured.

*This difference casts shadows on other guiding concepts in projects on how to reach the producer.

Conceptual errors in land use, land tenure, family, sectors complementarities and internal dynamics of rural systems are behind the repeated failure to address sustainability issues in development initiatives and to address rural poverty and environmental issues.

*The review of the (Green Mobilization) shows the same in-built defects of projects; sector policy is at stake where disproportional support to mechanisation to feed the inflated cities is negatively affecting traditional rain fed food production providing an incentive to more urbanisation, the cumulative sum affects the Gum Arabic business and traditional animal production, and the vicious circle rolls on itself.

* This point to a missing vectors that need to be considered ahead of deploying conventional economic tools. In rural households the importance of time as a parameter is ascertained; there are other vectors embodied in the coping strategies of the rural economy.

*Inclusion of land policy issues into national policy would recommend acknowledgement of the theoretical mismatch, capitalise on how to manage dry lands and redefining land in the National Constitution as (Arid Land) and encapsulating (Governance) to finally adjust current land laws.

* Environmentalists as a civil organisation managed to include the citizen right to enjoy a clean environment in the Constitution; with the current call for including land policy into national policy, highlights the need for a single focus with respect to land policy; the two initiatives are faces of the same coin.

b)SPECIFIC TO PROJECTS:

Within the executive capacity of the projects there are important successes and lessons:

-The sheer executive capacity of Sudan's projects is a credit on its own account besides the high level of commitment.

-These qualities are in contrast to the departmental format; excessive departmentalisation is a symptoms of system failure.

-The operational principles and procedures of projects can be manipulated to restore the efficiency and effectiveness of the civil service.

-Projects environment incorporate a wide scope for innovations, knowledge and experience sharing which are regrettably dwindling in the linear format of government technical departments.

-Projects are task oriented. The focussed input of projects resurrected the missed coordination efforts of the line agricultural agencies; yet, projects did hardly escape the interdepartmental sensitivities.

-The stand alone project format leads to successes but equally at a cost to the spill-over in its techno/administrative environment.

-The convention of collaborating agencies proved to be a good operational criterion in the absence of a single focus policy in government chambers; it is now increasingly adopted in the projects program format. It is noticed that long term contacts with projects and NGO activities enhanced the technical capacity of the line departments, at least on the personal level.

-There are fragmented initiatives in time and space covering programmes particulars in crop and animal production, community management and institutional linkages that resulted in the smooth running of projects activities; in addition to how sustainability issues should be addressed. This last issue is beyond projects mandate to address as a policy issue. Examples that can be cited are seed and nursery management, community grazing and intermediate technology transfer and possibly credit.

(2)THE LAND POLICY MAGNITUDE:

Two issues are critically important for the current controversies in projects; success on the one hand and failure on the other, with respect to the future land policy road map:

a) The projects conceptual framework, as guiding principles in projects design and inter-alia, how to reach the peasant. The current land related conceptual errors sources furnish ground for revising land laws.

b) The constitutional/ legal framework; inclusion of land policy and land laws is dependent on properly defining land in the constitution.

The necessary steps to deal with the embodied issues are not phases, or a simple coordination; principles of the critical path analysis are to be envoked.

a) The conceptual framework:

*Market economy theories stems from land where production parameters are guaranteed; the potential of land parcels was known for certainty, private ownership is the overriding rule; in transactions over land, location, size and attributes were endorsed and guaranteed by the States Registrar; against that, registration is defined as a security of deed. Branching from these attributes are the consideration of land as a factor of production,(Land ,Labour and Capital), investment in land collateral, credit. Land use in this setting is a descriptor, and only comes as organizational criteria

when the use mode is to be shifted from agriculture to industry or urban use as examples bringing forth compensation principles.

*When coming to (Arid lands), the operational concepts are squarely opposite to (land) in the market economy where the decisive factor is rainfall which is variable.

Land itself is the cumulative sum of ecological parcels with differences in resource endowment, each in its own account is self regulating. Through centuries, inhabitants developed management systems that restores the internal balance and established bilateral relations to accommodate hazards of nature. The whole set-up operates though interlocking systems; ecotypes, livelihood potential, production and consumption. The traditional management systems were geared to safeguard the ecosystem functioning and accommodate unexpected environmental hazards in what may be termed the tribal governance.

What is aired now impinge hard on land related issues; defining land, re-organisation of land use and fixation of land tenure on lease hold bases; projects design rests on economic concepts based on basic assumptions; some of the salient points are listed :

-defining Land as a factor of production (land labour and capital) falls short of embracing the time magnitude which is critical in arid lands.

-land use parameters are different especially rainfall. In arid lands rainfall is a variable.

-land production parameters are known for certainty whereas in arid lands variables

-The fixity of land production parameters in temperate climates furnished for formal endorsement and guaranteed financial transactions (registration) and in turn served as collateral for loans. Attempting to follow such procedures in arid lands without consideration to this background raises more than one question. Pre-conditions of (modern state) do not imply adopting a blind blue print

-There is no problem with mapping land use as a shot in time; but all the risk is attempting to disturb the ecosystem balance through an alleged rationalisation or organisation.

To super impose alien concepts on these systems format would result in erroneous policy decisions as it did in the past and will do in the future; balancing water provision with the ecosystem capacity, mechanisation vs. Animal production; the hashab and arable cropping interface, production systems complementarities, demarcation of stock-routes; land registration, leasing, credit and collateral etc.

Part of the far reaching interventions is the Unregistered Land Act and The Peoples Local Government Acts; both aimed at revolutionalise the society pursuant to the (modern state) pre-requisites.

* Ecosystem functioning is dynamic; implying that it has speed and magnitude; any intervention would affect either the speed or magnitude or both. Examples that can be cited are rain water harvesting which is positive and provision of drinking water as a negative sign; water in itself is recommended but the problem is embedded in the satisfying limit

*Technically concepts of ecosystems were operational frames for farming system research and extension; currently is being picked by environmentalist.

b)The constitutional/legal framework :

Singling out inclusion of land issues in constitution as (THE) cornerstone in policy framework because it chain-links with (Governance). This last issue goes beyond (administration) as it entails scrutinising the attributes of land; which loops back to the conceptual attributes of land as (Arid Lands).

The process is neither simple nor easy as it impinges on techno/economic working principles and rule philosophy.

The definition of land in the Transitional Constitution of 2005 and earlier is blurred, except for the citizen right to enjoy a clean environment and a reference to land in the context of Regional Rule; whether the government is an owner of land or a custodian on behalf of the society is hardly mentioned.

The continuum of the colonial land policy is evident throughout the amendments of the Unregistered Land act, culminated to full government ownership; the urban bias in land laws is increasingly felt.

With that there is the confusion of misinterpreting the Government ownership with the basic citizenship rights to own and settle; whereas the urban land laws included organisational legislations, in rural areas it is left open for the administrator's judgement. Amendments of The Peoples Local Government Act and the Unregistered Land Act went for consolidating Government authority and whatever role for empowering the community was demolished; to mention but the few, the executive officer as a secretary for the Peoples Local Government Council and the Village development committees for salvation and development.

The cumulative effect of the current land laws; is the current environmental disaster. One of the earliest results is that land was becoming an open resource in the absence of regularity mechanism, subjected to intensive mining beyond the capacity of the ecotypes. Catering for the local political support and eagerness of the executive councils to increase revenue had further aggravated the problem.

The sensitivity of the stakeholders to the land related issues is doubtful compared to neighbouring countries; the latest raised issue about the need for a land commission boiled down to a replicate copy of the Land Disposal Committee of the Ministry of Agriculture.

Land policy is problematic in many third world countries; Governance in the neighbouring Chad was addressed in terms of appointing tribal leadership through presidential decrees, in Ethiopia and Nepal under socialist Governments invented the concept of Ethnic Democracies, Mozambique and Kenya both embarked into a land reform to readjust white settler's holdings, Namibia fell in the democratisation trap. Uganda remarkably commissioned a task force that came with far reaching recommendations; the methodology, perception and commitment are salient features that need to be accompanied in the prospected revision of the Sudanese transitional constitution with respect to land policy.

Internally (Environmentalists) are already in the track to raise the issue of (environment and the constitution), focus is likely to be on the deterrents and incentives.

Some of the important salient points to be considered in inclusion in the constitution are:

-Defining land as a community property and the state as a custodian

-Defining land in its ecological context, not to be abused

-to invoke the traditional environmental regulatory mechanism

-Central and Regional authorities are committed to the optimal use of the land resource for the public welfare

- revising the mandate of the Land Commission to incorporate tribal governance and domains (renamed local authorities) as ecological units.

-Land commissions at the Regional level are to be part of the security committee; at the Centre the committee addresses the constitutional affairs.

-The Local government to capitalise on coordinating the budgetary control and the service sector.

-Revision of land laws in accordance with the above:

It is sceptical that the Land Policies Unit will have the capacity to deal with this multi-faceted issue on its own account as it impinge economy and rule philosophy; as it entails restructuring government spending in giving it a magnitude; disbursements are likely to be tied the resource base improvements in the specific system format in comparison to the current selectivity and blanket cover format; sector policy would be balanced.

Linkages in terms of (Governance) are important; the UNDP statement is illustrative:

Decentralized governance of natural resources (DGNR) concerns the ownership and control of, access to and use of resources. This involves decision making and the exercise of the powers over others. DGNR is considered one of the key strategies for promoting sustainable management, equitable decision-making, promoting efficiency, participatory governance and equitable sharing of benefits accrued from exploitation of natural resources at the local levels. It entails the process of transferring some of the decision-making powers and responsibilities (fiscal, administrative, legal and technical) to sub-national institutions at the provincial, district, city, town and village levels.

For the Land Policies Unit, joining forces is necessary. Land related issues can be manipulated across three platforms:

- Addressing land issues in relation to (citizenship rights and governance) through civil society organisations, focusing on beneficiary inclusion within the traditional set up.

- Through series of technical workshops investigating the entity of (dry land) and implications on public investment and sector policy; academics, politicians, executives and media are potential contributors to raise the level of awareness in policy dialogue.

- The Abuja, Nuba Mountains and CPA Agreements where land issue was addressed with some clarity; this suggests a region/centre progression, the anticipated problem is embedded into regional priories with respect to the time horizon preferences, but it has much potential for policy inclusion.

3) SUSTAINABILITY:

The term in its national context is quite fluid in relation to priorities, examples that can be cited are the indignation of wheat and livestock improvement through imports of bulls and cows from South Africa

For the purposes of lessons learning in projects; sustainability can be defined in terms of the stability of the dynamic generation of stream of benefits. In project it is a function of interdependent factors incorporating the qualitative and qualitative attributes of tool, institutional setup and the conceptual frames of interventions.

A) PROJECTS TOOLS

Tools in projects are the inputs range deemed necessary to trigger that productive capacity of the producer; the institutional setup is the backup mechanism that support the tools supply and the conceptual frame relates to the current and idealised image of the beneficiaries over the whole range of the society needs, this if understood correctly the others would naturally follow.

Since the shift of project to programme format and community empowerment; besides support to social services ; projects concentrated on improved seeds, intermediate technology, farm machinery, credit, gender issues, and targeting the poor.

In all respects, projects had filled a (shadowy) gap in time and space; once projects terminate there will be no felt difference between projects beneficiaries and neighbours.

a) Improved seeds unless taken as a generic term, are sensitive to the spatial distribution of rainfall and the respective ecotype endowment. Where rainfall variability is high it is noted that seeds migrate north and south as a coping strategy; this brings forth the notion of land races and explains why in adverse conditions as 1984 where everything was supposed to be consumed, land races re-appeared in 1985/1986.

   Improved seeds should be perceived as location specific with attributes better than the land races in the respective environment. Farmers own research was internationally recognized, one important notice is that exchange and experimentation of new cultivars is a norm throughout the Sahel belt.

b) Intermediate technology is vitally needed to expand production frontiers, being criticised as expanding cultivation at the expense of the fallow. This embodies three notions; appropriateness, supply and misconception of the traditional land rotation.

   For any rural man he will be mindless if he refused the offer on trial and error bases; secondly it likely to be supplied through a credit facility, for the public, and under persuasion, with the exception of Government and trade chambers; is a (miri).

   Linked to the above is appropriateness and supply; ploughs in particular are heavy for the standard animal (donkey) and the capacity to keep a horse or camel is limited rendering the machine as obsolete as can be seen in the Nuba Hills and other places although farmers recognise the potential and where to use it.

   For most projects the institutional support to replicate was lacking possibly for the limited time frame of the project. It is only with the pre 1985 projects partial success was felt where both the Nuba Plough and Jebel Marra Plough were fabricated locally on contractual bases and after thorough experimentation; the exception in this respect is the Donkey Plough of Western Savannah who went from the start to local blacksmiths to fabricate the tested prototype.

   Tractorisation is the most intricate issue; for a single producer or group of farmers it is the 1000 feddans to be worked, the problem is how to administer the capacity of the machine and sustain the serviceability and insures the timeliness of operations.

   The formal choice went for privatisation; the paradox is that communities are badly in need for the service and the available vents are either subordinate to difficult commercial conditions or group under the cooperatives structure which is Para-government but do not lean to community sanctions. On nature communities manage shared resources like deep dug wells and communal village herds, in both, users are coherent and comprehensive entities and in both there is a care-taker responsible for

the efficiency of the service. These management systems to be studied and the Government should allow a room for learning in piloting format provided that persuasive approaches should be avoided and most important (democratisation) of the process would affect it negatively, invoking community norms is a deterrent for negative opportunism.

c) Credit is a parallel fund in the Agricultural Bank, the responsibility of the bank is administrating the loan. There is a discrepancy between the Banks terms and conditions of lending and disbursements and the conceptual lending framework of the projects; the parallel funding is a midway solution to this discrepancy. In that the Bank is a risk avert.

Credit is supplied to finance inputs or operations; soon after the project ceases the project's seed money erodes. The question of why rural money lending institution survives and the projects money erodes raises the question of appropriateness. It is obvious that the range of needs covered by local institutions is much wider and case sensitive that the formal lending. Secondly, the problem of effectiveness of demand, in rural credit it covers consumption and productions and repayment invokes social norms including court and procedures seen as defaming publicity.

What can be inferred is that credit is to be fine-tuned to circumstances, public relations with beneficiaries proved to be effective where the local extension staff and local authorities are partners in what was termed deferred payments

d) Gender issues, women headed house and targeting the poor seem as corollaries in most projects; what realities behind are not asked taken as visible facts. It is interesting to note that Rural communities are recipients, when approached by an executive council officer for an elected committee an agreed upon list would be provided; when an NGO requires a non government body another list will be supplied, similarly the enquiry about the family will be meat with what do you mean by the family.

Family and land are inseparable in the rural context, nucleus, extended and expanded family are stages in the family life cycle closely related to family land cycle which boils down to how to manage livelihood.

B) INSTITUTIONAL SUPPORT

In projects experience generating benefits stream for all innovations and input supply depend on a localised and committed institution that cares for injecting regular doses of the required input. This implies formal and non-formal institutions.

The situation with the traditional sector was known to have reached its limits given the present level of technology and environment. As early as mid seventies of the 20'Th century research was supported to cater for improvements in almost the whole range of the sectors needs. Efforts to create a parallel organisation failed with incorporating Western Sudan Agricultural Research Station into the central authority.

IMPROVED SEEDS/RESEARCH INTERFACE

With formal research there is more than one problem:

a)The centralisation of research is a constraining factor; with mandate as a paper-work it is likely to be a grasp all once job ratification in the mid-seventies induced the researchers in the agricultural line departments to affiliate and finally to shift to the central research authority. The implications of this restructuring turned department's staff to executives with no incentive to upgrade the starter technical knowledge

b) The adopted structural format for output dissemination rested research to recommend on the (take it or leave it) principle or recommend; extension to pick and plant propagation to multiply and endorse quality. Between the three, accountability was lost

c) There are no signs of basic research and instead, adaptive research was to fill the gap.

d) There is repeated criticism for the research authorities on capitalisation on laboratories more than field investigations.

With arid lands this situation needs to be rectified:

-Specificity of the regions as eco-types demands a resident institution as a corporate body with region-specific mandate; staffing is to be seconded from the respective departments and for specific topics for specific localities.

-For the Regional Ministries of Agriculture, there is a vent in IFAD's project as a facilitator for knowledge management which is vital for technological where and how filling the vacuum for adaptive research as described:

(The project will contribute to knowledge management in the following ways:
(i) networking in the Near East and North Africa region and the Programmes Management Department on techniques related to soil and water conservation and livestock nutrition and their uptake by smallholders; (ii) in-country networking through annual implementation workshops, donor coordination meetings, seminars and workshops; (iii) regional knowledge networking, especially through the knowledge Access in Rural Inter-connected Areas Network (KariaNet); and (iv) regional research networks such as the International Center for Agricultural Research in the Dry Areas (ICARDA), the Arab Authority for Agricultural Investment and Development (AAAID) and the Arab Organization for Agricultural Development (AOAD), in addition to the existing partnership with the World Bank, the World Food Programme (WFP), the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Development Programme (UNDP).)

-Project experience indicate that in-situ proven cultivars seed propagation on farmers contractual basis, matched with mapped placement areas, are successful and risk free, compared to commercial contractual relationship.

INTERMEDIATE TECHNOLOGY

Project experience indicate that the technology flow starts with applied research works on design, and test, to be evaluated at the field level by the extension staff and farmers.

In research priorities; tillage operations and seed placement should be manageable in design but more work is needed in weeding devices.

Implements should have the quality of being fabricated at the local level; local manufacturers can be supported through introducing manufacturers groups or individuals to micro-financing. It is found that the closer the relation between researchers and artisans the scope widens for improvement at all levels.

REVOLVING FUNDS:

A linkage with the Localities, tribal Authorities and unions is recommended for the sake of joint accountability, and policy support. This relationship is best translated into a unified revolving fund that cares for focussing programs input supply including animal production.

The internal tenure of the revolving is suggested to accompany a commercial orientation- and not profit orientation; to include a profit margin as a buffer against erosion, a honorary incentive for research, extension and supporting services, ranked in terms of the execution work load and supervision work load; this insures giving a good product and from the other side good distribution and loan recovery.

EXTENSION:

Extension staff at the field level should be cultivators on their own account; demonstration farms are a cost and there is no material evidence of being effective, except being part of the conventional extension tool kit.

CREDIT:

It is suggested that credit should be community based running through revolving funds, it should be stressed that contact bodies should be non government traditional institutions; amount and range are to be considered by the resident extension staff with these institutions including payback capacity in cash or in kind. As operational criteria it worked. Inclusion of consumption goods was found in some NGO's credit format but not much is known about the final evaluation, in as early as 1976 a local figure in experienced with consumption goods provision in grouped village holdings in a semi cooperative bases, production wise the experiment was successful, but the disagreement was in profit shares.

POLICY ADJUSTMENTS:

Whereas sustainability issues are multi dimensional, requiring adjustment at various levels; it is felt that these issues are to be addressed by Under Secretaries of the Ministry of Agriculture; the minimum prerequisite is to re-orient the agricultural staff capacity from administrators to technicians.

Undersecretaries are expected through capitalising on the technical aspects to come with a solid working paper addressing policy issues to be endorsed by higher authorities; and inter-alia will support the land policy initiative.

4) MAPPING ARID LANDS

*Maps are user specific with respect to the issue in hand. The level of details shown on maps depends on the scale of the map and the geographical coverage. For technicians maps show the maximum possible details; for policy issue these details were abstracted in the salient features.

*For operation purposes the ordinance survey maps were standardized to the scale of 1:250000, the range of attributes shown such as place names, communications, contour lines and drainage links to the potential serviceability of the information supplied. At present and with FAO assistance the whole cover is digitized, accordingly, soft and hard copies can be obtained from the Survey Department, or from the Forest Authorities who had it a an aid to the compilation of Afri-Cover.

*By virtue of being Arid land; mapping in the context of Arid land policies Unit is critically needed for building policy frameworks; entailing quantification of almost all arid lands attributes, plant cover, soil, water resources, communications, land use and population distribution.

*Policy decisions are at best, subjective; partially as a result of errors in conceptual framework; but more important as a result of the severe lack of quantified base level data with respect to systems capacity and use magnitude.

*The logical out-come is the un-responsiveness of rural economy in general to development initiatives regardless of project and program pending.

* Though information generation is partial; yet it is basic for policy at all levels of governance. Examples are food security, poverty, strategic reserve, carrying capacity, resource endowment and systems condition and capacity.

*With Regional Rule centralization of this type of information is defective. Regional Governments are needed to feel the work load and enhance shared accountability.

* Rectification the perception of Land as Arid, implies adjusting information frames.

* It I noted that eco-types frames to a large extent coincide with tribal domains and Local Government Boundaries. This set up builds through Regions to the National level.

*The range of information is supposed to be applied. It is of paramount importance that data generators at the base level comprehend what is actually meant in map projections and types. The section of mapping in this report can be easily upgraded to a manual through inclusion of the technical methods of generating data; how to measure the carrying capacity, how to estimate the cropped area and how to show distribution facets on maps are salient examples.

*Eco-system frames are found in the Afri-Cover-entrusted to the Forestry Department, The Range Condition study-entrusted to Range Management Department, The Aerial Livestock Census of Watson and Tippet-entrusted to Veterinary Authorities, the Technical Assistance in Drought preparedness and desertification-entrusted to the Soil Conservation Department. With the completion of Darfur Land Use study it is hoped that a National soil map can be compiled based on geomorphologic description. The Remote Sensing Authority can be contacted to screen out a unified format, region and Locality wise for reasons of serviceability.

*It is noted that Arid Land Policies Unit had already embarked in GIS courses, but for the serviceability of information it is recommended that courses structure should include application of this knowledge on the participant locality or region. Many do have the basic skill for (cut and paste) but to convert numeric or digital data to serviceable information is a problem.

*The current proposal advocated a bottom up build-up starting from the Locality to the National level. Regional Governments are likely to respond positively since they feel the burn before the centre. Currently there are rigid rule with respect to information sharing even within States Departments which have negative impact on policy. The proposed system is likely to bridge this gap.

*It is suggested that the Soil Conservation Laboratory to specialize in feed and fodder analysis, where this information is critically lacking. It is of no use to know the types of grasses without consideration for the density and quality.

*Each department should consider activating its resident staff at the Locality level to generate the required information. Synthesizing the whole range of information is a Ministry's concern at the Locality or Headquarters level. The resultant information can be injected to a Region's bureau.

* There is a need to discuss the issue with the Agricultural Statistics Department to adopt this approach, in the face of the current stringencies a positive response is likely. If agreed the others agencies will follow.

*In due course, statistical models are to be built

PART TWO

LESSONS LEARNT FROM ARID LANDS PROJECTS

METHODOLOGY:

The guidelines for lessons learning rest on the proposal forwarded for execution of this consultancy work; taking into consideration the Dry Lands Policies Unit mandate, goals and tasks and anticipated future work.

Two important magnitudes are considered in lesson learning:

a) As the nature and range of projects is quite large; it is found necessary to track back projects progression through-out the entire period since independence with some reflections on the colonial era. The number of projects cited in the proposal is 20 but the term hosts hundreds if the NGO's activities were added.

b) In consideration of the projects residual, the internal project evaluation as per project completion document is necessary but not sufficient to extract lessons for the policy magnitude. Hence, an alternative methodology that focuses on operations principles was adopted; defining the problem, assumptions, setting the objective, tools and results.

   This is particularly important as an analysis tool when the out-come falls short of fulfilling the objective

For guide lines for search, some key words were scrutinised:

Project,

Dry,

land,

Policy,

mapping and

Unit

Meaning and implications of these terms were considered and inter-alia; Government and Donor's rationale behind institutionalising the Arid Lands policies Unit, in itself, simple and direct:

* The quantified projects/interventions in the overall evaluation were met;

BUT:

- With low project residual, projects are unsustainable and more action is needed in rationalisation of land use/land tenure

-There is a need to include these land policy issues in the national policy`

This message is common to IFAD, UNDP, FAO and the World Bank.

With that in mind, it is logical to trace back what went wrong; such question is rarely asked internally, inter-project comparisons were temporal and costs and returns were rarely referred to. Most of these broad evaluations were found to have an academic external origin to the Donors and Government questioning the theoretical principles of project formulation; the relevance of this magnitude stems from the fact that projects are financial investments influenced by the economic conventions of the time, which is clear in the Sudan case.

Review of literature and documented material started with the Donor's projects objectives evaluation and expanded to the techno/economic aspects and projects evaluation which is categorised for the purposes of this work into annex, basic reading, evaluation, mapping, theory and methodologies supplied as soft copies for future use

RESULTS AND FINDINGS:

DEFINING LAND POLICY:

Land policy in projects design is a corner-stone, the relationship of land to economic and social theory is often missed, projects in all shapes and forms; at the end, are financial investments subjects to costs and benefits.

Land policy is a constitutional concern incorporating the community ethics with respect to ownership of land as the basal resource on which governance is super-imposed; from thence economic theories branch and social theory would be called on to explain the behaviour of the community; an extension to that is social engineering which focuses at how the community should be. In the Western world the question of land had settled to private ownership as a fact of life and all the hot issues centred on how to maximise production at the micro production level and direct the economy in its macroeconomic level.

It is to be high-lighted that in temperate climate from which we borrowed our economic principles, land production and productivity parameters are fixed leaning to maximisation in comparison to the dry lands where nature's attributes are variable where need is more for management.

This very important difference is behind many mismatch errors in project design. What is needed to be incorporated into the national policy would depend on adopting either of the two conventions, maximisation or management principles.

It would be of value to consider the costs and returns of projects which are rarely referred to; but with view to the current environmental paradox; not to say crises, the limited search indicate an alarming figure of (1300 million dollars) compared to projects residual

With this difference, Lesson learning project evaluation, two magnitudes were considered:

Firstly, the model building focusing on project conceptual framework, whether in match with the realities of life on ground or not; including socio-environmental attributes

The second aspect deals with the project itself, taking into account regional scenarios as the first level and then proceeds to the internal dynamics of the project

This lessons learning is an insider evaluation as a recipient; looking for a longer term impact of development projects with respect to the current socio-environmental crises.

A parallel evaluation of projects of an outsider highlights the conceptual philosophy of projects and the end results of the various projects executed; consideration here is for the rationale and not to the internal quantified targets:

"When Sudan became independent in the mid-1950s, however, the leaders of the new government saw a poor country whose grasslands had immense potential for development. Eager to spur economic growth, the Sudanese minister of agriculture in the 1954 transitional government asked the United Nations to provide experts from the Food and Agriculture Organization (FAO).Their arrival set in motion a chain of events for agricultural development in the grasslands that daily grows more complex."

"The work of those early experts and all but the most recent of their successors has been nearly forgotten, even to development practitioners in Sudan. Few things, it seems, fade from memory faster than a development project whose funding has ceased. Yet new projects begin every year. Designed almost without regard to what has gone before, they often repeat the errors of the past. A critical history of almost a half-century of efforts to improve Sudanese grassland agriculture may therefore be useful both to current workers in Sudan and to anyone broadly interested in the perils of planning."

"Today, the enthusiasm felt by development workers in Sudan is directly proportional to their ignorance of history. The more that history is weighed critically, the likelier will be the conclusion that Sudan needs a more cautious approach"

(Improving Traditional Grassland Agriculture in Sudan), Bret Wallach, 1989

In the above, two points crop up:

Firstly, that FAO is an initiator,

Secondly there is an error source un-checked;

Consideration of project failure can be evaluated from three angles, the rationality of the Donor objective, secondly the recipient and thirdly the project internal dynamics.

Whereas there are conceptual errors in Donors objectives, there is an inherent problem with the recipient. Internally, failure of projects to address the main issues, do not discard the possibility of compiling partial successes in addressing these issues, which loops back to the policy frame work.

Not much can be done with Donors perceptions unless there is a firm foundation of information (which are clearly lacking), were internationally these concepts severely criticised; Robert Chambers came with (Tarmac Road Tourism, Putting the last first); others focussed on the conceptual rules that influences the (House-hold) behaviour; this came strongly after adopting the farming systems research and extensions especially the linkage to the (New African Household) theories.

For the recipient, an in house repair is necessary, concepts of land use, tenure and farmers response need to be rectified. There is a need to perceive the rural livelihood as a system, individualisation of system components as mechanised, rain-fed or grazing is suitable for education purposes but feasible as a working criteria, at best it lead to the fragmentation of the Ministry of Agriculture.

With land policy it is very difficult to isolate use or misuse of a defined territory without taking into account the neighbouring areas that reciprocate with it. Within projects there are initiatives on how to manage a specific problem; not necessary in line with the perceived objective at the project design, but more adjusting the objective to the facts on ground.

ANALIZING THE PROJECT CONTEXTUAL FRAME WORKS

The logical sequence the overall project evaluation, is to consider the perceptual model against which the problem was set, the objective, the strategy to adopt to attain the objective which covers the internal project programme particulars and lastly the quantified targets.

The conventional project format considers the last two; whether the quantified targets of programme particulars were reached or not; the first two are taken to be, given; in which case almost all projects seems successful.

The lesson learning exercise focuses on the problem, whether solved or not; in this the disparity between the project and the problem would be seen clear.

THE PROJECT ENVIRONMENT:

a) THE OPERATIONAL THEORY BASE:

*The review of the parallel evaluation indicates clearly that, In Donor's funding the Sudan was a recipient; this by no way is meant to relax endogenous factors; our mental frames are likely to be the same school of thoughts whether projects succeeded or failed.

In the Sudan there are real problems which through time transformed to insecurity. What is going on in the national hot spots are models capable of being repeated any-where and any time but not cases, there is enough evidence to support that, but it is beyond the scope of this survey.

* The dominance of urban based culture is a continuum to the British school which do not perceive rural communities and structures beyond the superficial attributes of the north-south migrations and lineages, it is now over 100 years of continuous pressure to individualise the producer as a firm with no much success; where land was registered as a free hold at a critical time part of the extended family as share holders will deliberately leave land to others to live on. Land is not only a production factor but serves other purposes.

With political economy project initiatives run across the legitimacy interface between a misunderstood old order and invoking operational concepts; without being fine-tuning to realities on ground.

In project inception and formulation, the thrust of the two, (borrowing and misconception), impinge hard on land related issues:

1/- The problem of (LAND USE); the functionality formula in the European context is squarely opposite to conditions in arid lands: in the European context rainfall is fixed and land attributes are variables. In the dry areas Land is fixed and rainfall is a variable.

2/-Tribal governance which was built over say, 4000 years, geared towards livelihood was utterly misconceived, the visible part is tribal administration as per British Anthropology; if redressed in modern terminology, constitutional rights of individuals, external affairs, judiciary institutions, security and home affairs match the most modern state. At the extreme, when perceived in a context of a(state), tribal domains portray a federal format. Internally, tribal subsections enjoy a federal rule. The main draw- back is that in the European mentality which we are part of, deprive coloured, blacks and Negroes of that right. The Sudan Notes and Records clearly indicates that.

3/-Linked to the above, is land tenure; it is held that registration of title is the means for security of tenure. What we learnt from Her Majesty's land Registrar, registration is a security of deed; which means that it has nothing to do with investment; this should be read concurrently with the development of land use in Europe. It is not value free.

4/-Defining the household rigidly as a basic unit (6 persons) is erroneous, on nature nucleus family, extended family and expanded family are stages and forms of the family development cycle; this is inseparable from land utilisation and livelihood. The family do not by necessity conform to the theory of the firm; in our case, time is an important magnitude. The first two weeks of the cultivation season determines the next year's consumption and saving; hence, cultivators are targeters.

In addition to the above; the corollary below holds true:

*For technicians to borrow global international jargons flatly without adjustment to local conditions leads to erroneous policy implications; misuse of resources is an adaptation process or encroachment, up to now many (seniors environmentalists) hinge on encroachment pursuant to the Asian or Latin American model whereas it is beyond doubt that the current desert belt had been the productive part of the country; the belt was continuously shifting south in response to deteriorating conditions. Any of the two (misuse or adaptation) would have policy implications. The very recent issue of (land commission) can be cited as originating from the Comprehensive Peace Agreement; with peace the Foreign Observer felt the need to work out a solution for an expected problem; but

not the need to create an additional institution without conceptual guide lines. In effect the institution was created with regional out layers on what bases nobody knows. It points to the clear fact that coding is ahead of setting the problem; why the issue was raised from the beginning have no answer.

Secondly; the question of policy: For any politician or stake holder, making decision is the easiest part but always stuck at the level of details, triggering a vicious circle between the technician and the politician bringing any improvement in rural livelihood to a stand-still, which reflects the absence of basic work on ground.

Thirdly the standards of procedures in agriculture as a discipline, whether agriculturalists are technicians or administrators, the domain of (field affairs) has technically flattened agriculturalists especially after researchers confined themselves in a tower of their own; the credibility of agriculturalists in policy affairs is at risk for that simple reason .

This may seem absurd but had been working throughout the Condominium era up to the Late 1960's where the technical know-how is more important than the administrative ability. A revival in the mid 1970's, which did not live long, under the guidance of the newly created State's Minister of Agriculture would probably be the last time for the Ministry to pull itself together.

Fourthly: the definition of development is a puzzle; vocally the main concern is livelihood and rural welfare; but materially it boils down to social services. The question that poses itself is whether there is an agency that offers solutions which bring back the problem of details. At present from the lowest level in the civil service structure to the top layer are decision makers.

Lastly, when interventions corrupt an existing system and create a skewed situation on ground; in fact there is no intention for revision and at the same time no highlights of a new order are aired.

b) THE POLICY ISSUES AND BACKGROUND:

*Arid lands as an international convention need to fine tuned to local circumstances; for technicians and politicians it is flat enough as being lived as a fact of life.

*At the international level the environmental stress on the zone of (arid lands) is evident. Internally, the problem is well apprehended but the way out is a difficult ride, technically and institutionally, subject to complex arrays of perceptions developed by cross-cutting international paradigms. Environmental degradation did not settle yet on whether it is adaptation or encroachment which is a corner stone in policy magnitude; as recent as 1999 some prominent figures take it that human activities around a 20 years old water-yards is the cause of degradation, but provide no answer why a 400 years old natural well field is intact.

The basis for national policy beyond the technical knowhow rests on the degree of association between the decision maker and the socio/economic context that he was supposed to serve; what economy they want to run and at what cost. It is not expected from the Ministry of finance to reflect on GDP and GNP, these terms for rural people and rural workers are likely to be a source of distraction.

Broadly problem are the same when addressing poverty, degradation but assuming uniformity across the regions is an error. The private sector is not a blanket cover for simple producers and wealthy merchants. The basis of rural livelihood is maximising the use of time and self employment

*This brings forth the question of rural production parameters; evident enough, all production, consumption and traditional resource management are comprehensive systems. Once these systems were fiddled with, a total or partial collapse is inevitable. Two examples can be sited, tribal governance was barely understood and only the (native administration) which was abandoned in 1972; the repercussions were clear but urban-based interests do not allow any revision.

The second example is the stock-route which is projected by stock-holders as trends, is skewed in cause-ways joining watering points, in essence it is a web facilitating crossing from east to west within the general orientation.

*There is over simplification of understanding the internal tenure or dynamics of these parameters or fragmented and dilute perception among the stake-holders, seen as facts of life. This vagueness is reflected in vague statements as being (The Policy); meanwhile calls from the regional and even central authorities for the need to draw a new policy or a new strategy were raised. When a draft country paper or strategy is published; in the view of related partners, is a one man document.

Policy domains are mixed; one clear illustration is when the regional authorities speak out macro-economic principles for application at the grass root level, especially when it comes to the convention of (investment), or empowering local leadership at time the executive officer speaks about (his) (thirty sheikhs).

Politicians and technicians alike are under pressure to show achievements. Where appropriate initiatives are demanding in terms of time or public spending, second or third best solutions are the handiest to enhance own image especially when input was expected from more than one agency; it is always some other's person responsibility. Handling environmental or livelihood issues is sequential, to note the rise of Soil Conservation, followed by community development, to mechanisation, rural development, empowering communities and currently the stage of community based development. These bits and pieces are needed in any locality; how these traits can be integrated is the puzzle. Past experience shows that it happened, and recently from project experience the convention of collaborating agencies proved to be a reasonable vehicle, other things been equal. The limitation with the current status quo is who will integrate with whom.

*There is an obsession with legal frame-work, whereas it is evident that (law) per-se can- not resolve the environmental issues; laws are enacted at the peak of the respective department's political support, to mention but the few, mechanised farming, forestry, environment and nowadays drafting a law for range use. Up to 1960, any law is a product of recommendations of a technical or administrative problem. If there are deficiencies in understanding rural systems particulars, laws will naturally follow; There is need to set the problem and an over-all revision should follow

*For the policy (sections) within the Ministry– because they are many, and possibly do not recognize others -, to proceed with policy issues, there are choices ranging from (stand alone) to (work for), reference to that is in part three.

Equally important is what strategy to adopt; it is either to follow a top-down approach, and that would commend a super political support which is not likely. The second is a bottom up approach effectively leading to generate sets of information geared to work out policy frame work, it is what (work for) implies, or materially, policy dialogue. In one sense it is risky where many stakeholders did build careers on the existing set-up; agriculturalists are no exception. This can be traces back to the period 1972-1976 when jobs were ratified and promotions were time bound and not the technical excellence.

*Besides the indigenous weaknesses (polarisation) of the agricultural departments at the centre; there is the regional interface, which is equally important with a possibility to be the cutting edge for policy reformation and reformulation.

*At present there is a wealth of broad policy statements, and at the same time calls for strategies and policies are voiced from almost all regions and at the centre. Any of these calls is defeated at the level of detailing how these policies will materialise; this inter-alia questions the capabilities of the technical staff and the civil service in general; there is a deficiency in basic information and inconsistency in information frames- resulting in (lack of resonance).

*There is no holistic approach to rural security issues, country paper, strategy, policy and the like jargons reflect individuals perception; in satisfaction of job's terms of reference with minimal circulation and discussion to form a general opinion

*There is much to be learnt from development projects experience, but should note; these initiatives are not layered, but widely separated in time and space even within the same region; put together, a development frame work can be perceived, but not to nullify the need for setting the problem and quantification in this respect is a must, other-wise things will loop back to whims and speculations.

c) THE SOCIO/ENVIRONMENTAL DIMENSIONS:

There are important points to be highlighted:

a)It is to be stated that projects are isolated islands; the sense of (having) is completely lacking, it is always IFAD's Projects, FAO Project etc., for the project staff this banner is raised to indicate for recipients the dis-association with the Government, but at the same time it is a counter measure against local or central authorities interference with project activities; for the Government agencies it projects a public relations exercise and at the end it is an expatriate business; the case of the Humanitarian Aid Agencies and Darfur Land Use consultancy work is a live illustration.

b)The second notice is the parallel or repeated input; there is a wealth of information scattered around in the absence of a coordinating body; this result is quite logical in the current rigid departmentalisation dating back to the mid seventies of the last century.

c)Projects are to address specific problems; in projects, monitoring and evaluation follow defined measurements of quantified targets, cumulatively sum to project objective; for most projects, there is an implicit assumption that another agency should carry over after the project completion.

d)The more intricate and subtle is the measurement of the underlying assumptions against which the project was designed, more specifically the project in its socio-physical environment; the coverage is one example, whether the 1000 targeted beneficiaries from the whole community members would generate the desired effect, bringing forth the question of sustainability.

Currently, urban swelling pressure is building to highlight problem of the rural areas; it remains important to cultivate this atmosphere if a comprehensive policy can be presented.

There is a general consensus about actual deterioration in more than one facet concerning the rural socio-economic welfare and at times alarming threats for sheer existence, these facets can be summed in four parameters, natural resource, animal population, institutions and technology.

These four facets naturally operate as comprehensive systems and should be perceived and managed as such, once this principle was violated, management collapses to satisfying job orientation more than task orientation. Rural economy is a comprehensive system, at a lower level there are subsystems of crop production, animal production, forest production and one of the big mistakes is singling one in isolating of the others.

Some of the common problems associated with the four parameters listed above, though not exhaustive, are listed below:

Increased aridity, Food insecurity, Biomass mobility, Partial high man/land ratio, High land-use factor, Decreasing resource endowment, Increasing competition over resources, Depleted resources (land),Imbalanced use and Lowered productivity.

Relaxing these problems is an overall objective for project impact. Project documents normally work within the range of sub-objectives as each problem has components; one of the difficulties is that none of these problems was quantified vertically or spatially ahead of project launch.

THE INTERNAL AND TEMPORAL PROJECTS DYNAMICS:

THE CHANGING SCENAREOS

In time and space projects rarely overlap; regionally they can be perceived as layers; meanwhile the **focus of projects shift from one criteria to the other**. In this respect nationally drafted project objective may not coincide with the Regional priorities which are sensitive to social development more than longer term interventions.

*The term, (projects) do not necessarily link with the recent convention of (arid lands) as the ice-ball of development projects had started to roll earlier:

-The Gezira Scheme is a pre-independence heritage started as an investment for British Companies and with it, foundations of necessary services were laid to include physical and social aspects. The motives were clear in this respect whereas management was too tight, but inter-alia, the infrastructure laid for piloting triggered micro irrigation substituting animal draft implements in the

Nile basin, cotton production continued to be important in these micro-projects as compared with the Gezira and later, supported the creation of Corporations in central Sudan. Later developments were associated with the Second World War, notably rain fed schemes for cotton production marking the beginning of the large scale mechanized cereals production.

In the Gezira at present, the system components are falling apart; the tight management system and responsiveness envisaged in the earlier project era is no longer present; in part it may seem an internal problem but casts shadows on the inter-ministerial linkages and coordination. The management component rests on the functionality of the micro and macro-systems embedded in the design. This may be one of the most important lessons to be learnt, to perceive development initiatives in a context of a system.

FAO has strong presence since independence in response to Sudan Government Invitation to assist. Following the second World War, it was mandated that the United Nations Agencies besides World Bank, World Monitory Fund and IFAD since 1977 are to assist the newly independent states, presumably subject to the conventional economic wisdom of the time; what appropriate vehicle should be used to energize the economies of these states. The recession of the 1930's had clearly influenced the choice; international trade and export enhancement were among the important vehicles. The progression starts with missions or in-called expertise; the question of funding was important whereas eligibility for lending had to satisfy pre-set requisites; the selection criteria and whether the proposals is credit worthy and satisfies lending conditions or not are important determinants.

The initiative mechanism was promotional, the in-coming organisations after studying the country, would offer assistance in particular traits. In this regard the Developing countries are willing pickers, on a background that, stake-holders in the target countries belong to the same school of thought;

In rural areas, and over time, sequence of development scenario can be noted; support for large scale irrigation, chain linking to community development, rural development, bottom-up approaches, empowering the poor and community based development at the current stage.

These changes since 1950's followed roughly a decade format, the services oriented community development thrived in the late 1950's and 1960's, an overlap of land use planning leading to rural development in the 1970's; since the culmination of famines in the 1980's scenarios of community based development came to the fore front including relaxing production constraints.

The background of any of the development scenarios, is an economic school of thought stipulating how the productive capacity can be set into momentum; the community development approach is non- land based on an assumption that social services are the vehicle for development, i.e. more education and better health would lead to social creativity. Land use planning in general focuses on optimization of resource use, when such an umbrella was lowered in priority the substitute came in relaxing production constraints in areas where benefit stream can be felt. At present repercussions of the war had shifted emphasis to support communities. The resource endowment plays a central role in project selection; Donors regardless of their willing to support would like to see felt results bringing forth regional profiles to the fore front, own production of food and oil crops, harmonization between arable cropping and animal production and relaxing constraints are

important determinants. Each region has its own specificity and in accordance, attracts particular interventions.

So as not to confuse issues, by approximately 1985 the standard format of projects (as the cutting edge of development) ceased. Between that period and now there are important initiatives from IFAD and other NGO's beside the Community Development Fund.

PROFILIN PROJECTS

Capitalizing on the chronology of projects does not reflect a continuum. The Sudan was credited with high level of implementation. Policy wise it is important to look at the residual of these projects; regardless of the alleged failure in meeting the grand objectives, there are initiatives at the execution level that should be considered in future interventions.

The magnitudes of time and space come together in regional frames; against the background of the specific environment and constraints, projects residuals and initiatives will be high-lighted in Darfur, Kordofan, Northern, Blue Nile and the East; Darfur can be singled out to have incorporates almost all development scenarios.

For the current exercise, the reference will be the rural areas, with the assumption that home policy objectives are mainly food security, minimization of friction, increase resource endowment, stop depletion and address sustainability issues.

Lesson learning is mainly evaluating the general trend. More than one question can be posed, project coverage, prospects of replication, leading to whom and where to target, policy consistency and what is the definition of policy and whether it exists.

In reviewing projects it may be seen that individual projects dealt with some of these problems, but individual projects with similar conceptual framework are widely a part in time and space not to constitute a single whole.

The general feature that cross cut against the range of projects, is the regional resource base as an influencing factor for selecting a project, on the background of the school of thought supporting the project; to consider the physical parameters as fixed, leaving the lesson learning to vary to evaluate whether this accumulated knowledge was used or not, and whether grouping of the singled out initiatives can form a conceptual frame work nation wise.

Within each region the critical path of development will be followed, what residual that it left on ground and what contribution it added to enrich the knowledge base.

THE NATIONAL LEVEL FRAMES:

Some works of importance do not fit directly in the project format, the Aerial livestock census, the Afri-Cover-(currently the Sudan Land Cover) and the extension of the Grazing conditions in the Sudan and the HTS.

The objective of launching these works is to quantify the issue in hand as a base to be frequently updated; unfortunately all are locked as a result of the excessive departmentalization within the Ministry of Agriculture. The information contained in the documents by now is out of date, but the data frames still hold true.

These original survey works (original in terms of adding new conceptual frameworks), came with a notion of ecosystems as (basic information units). It may not be intended, but the sampling frames adopted are logically information units; the Livestock aerial survey and the Range Condition demarcated sets of ecological parcels that matches to a high degree the local Government base units (Mahaliya) and it's sub units. The Afri-Cover is basically a pixel form and as such can be an over lay for any of the ecological unit.

Ecosystems have the potential of building a national or regional hierarchy starting from the Mahaliya sub-units to the Region and the National level.

What is needed is to refine the boundaries to be the standard frames for agricultural statistics and measurements. Currently the sampling and statistical frames are quite diverse to assist in developing policy guidelines.

DARFUR DEVELOPMENT PROFILE

Environmental conditions around 1950 are different from what we see today; fewer people and generous nature; that, lead the Ministry of Agriculture to embark on experimentation on different soils and crops; as early as 1958 the Mediterranean climate of Jebel Marra had special attention from within the country and the United Nations since 1957; an important bench mark is the establishment of FAO special fund at Khartoum in the mid sixties to work in draught related issues.

THE MINISTRY OF AGRICULTURE ESTABLISHMENTS

Besides the early horticultural work started in Jebel Marra in the late 1950's, two other sites were to be high-lighted, the Gureida farm to experiment on Goz mechanization and the Rizaigat Pilot Ranch commonly known as Ghazala Gawazat:

Gureida farm in southern Darfur was established to test Goz mechanization, the result was certain; mechanization was not recommended, yet area demarcation, staffing and gazetting as government property kept the farm activity on going, the other experimental site in Kordofan was abandoned

and possibly forgotten as the site did not go into registration procedures. It high-lighten the point that once an institution was created and staffed, the prospectus of revision are minimal.

With the rise of Regional Rule it became a regional government asset. The Ministry of Agriculture in the drift to show something was to encourage mechanization, the image of Gureida model and Um Ajaja was at the background, and inclusive, is the Darfur share and competition with WSDC. This was picked to an extent on wadi alluvium and sandy clay soils by private individuals, but blocks of land have been marked on Wadi Azom and Wadi Salih

In 1985, for problems of land tenure the Gureida farm was declared a settlement - similar to WSDC settlements- for famine destitute. Southern Darfur tribal domains are reluctant to accept migrants subject to the jurisdictions of the Un-Registered land Act. The settlement was occupied temporarily as a camp.

The surrounding area attracted cattle traders to license private ranches to the north -west; which are effectively no more than holding ground, cattle merchants are quick in cultivating the Regional Government enthusiasm for setting ranches. At a later stage a clan of camel nomads contacted the Government to establish a settlement for camel nomads; abridging tribal domains where this land is Government property, exclusively free of any tribal claim; which was accepted;

The Rizaigat Pilot Ranch was established at Ghazala Gawazat to the west of Ad-dain, contact with the nomads was possible since many stock-routes converge at that point. Initially the foundation was to work for the improvement of the Rizaigat stock in breeds and stock management. Through time the relations with the community were gradually eroding especially after the liquidation of the native administration, the general image of the station is a status of an out-layer of a research station. With this sense it was mandated to expand the area of the station, but to the astonishment of many, the new extension was devastated by the nomadic community. The causality was only revealed by aerial photography which showed the stock routs to converge in the shape of a funnel; the extension if materialized would block all the stock routes to the west of Ad-dain. (on what bases do people plan/ responsiveness to the Peoples Local Government to increase revenue)

For the two initiatives, there is a Loss of direction, the redundancy of the objective of establishing Gureida farm was not followed with a revision or re-orientation and for the Rizaigat Pilot Ranch, the station transformed from a service centre to a production orientation- an entity of its own.

By 1976, the strategy of WSDC towards developing Darfur, capitalized on Gawazat to be the headquarters of an independent research station (Western Sudan Agricultural Research Station). The rationale for an independent station is the attraction of researchers to a corporate, specialized, independent authority geared to rain fed agronomic research based at Gawazat with an out-layer in AlFashir; a similar arrangement was made for Kordofan at Al Obeid and Kadugli. Gawazat in particular unfortunately inherited its past; (Who will run the station is a hot issue between the Range Management and the Veterinary authorities; the central research authorities aborted the whole orientation) At present the research station building are rarely used,

THE SOIL CONSERVATION PILOTING WORKS

Since the transformation of the Soil Conservation Department to Rural Development Department, and under the banners of the Anti-Thirst Campaign, the department embarked in a series of pilot

initiatives, termed (projects) under chapter 3 of Government budget; on nature they are best termed micro projects.

An objective evaluation do show these micro projects as demonstration initiatives, in their own account they went into sustaining the vicious circle of budgetary problems, especially after the fading of the ani-thirst campaign; additionally, there is no prior conceptualization of how these initiatives can tie together to address the raised issue in a spatial context. The typologies of these projects embraced micro irrigation, water harvesting, nomads settlement, soil reclamation, animal production and later, bee keeping.

Two pilot farms round AlFashir at Shagra and SagEnnaam for vegetable, animal and poultry production; supplementary irrigation from wing embankment hafirs, rain water harvesting near AlFashir, reclamation of the gardud soils at Tambisko in south Darfur and experimentation on rotational grazing at Shag ElShaw/AlGilaiaa Alhimaira and another location in Goz Maaliya in collaboration with the FAO at Khamsat and Um Rakuba.

The feasibility of SagEnnaam was controversial; to pump water for irrigation 400 feet deep or more, is a problem; Shagra was smoothly producing for AlFashir consumption until the Peoples Executive Council decreed the hand- over of all revenue generating pilot projects to the PEC in pursuit of quick revenue generating projects.

The rotational grazing in northern Darfur was demolished as a result of political competition between the Kababish and the Kawahla, the site was a twin for Gereih Elsarha which is a domain for the Kawahla. The experience with the People's Executive Council shows the disparity between the executive and the technical mentality or the lack of coordination. Since then trainees in public administration are in the forefront. The other site in South Darfur had been demarcated and gazette for FAO but not much was done.

Rain fall harvesting was picked by private individuals, NGOs after 1984 famine, and currently is an important program in Darfur States, picked and enhanced by Aid Agencies in Northern Darfur especially in Wadi Kutom.

For the Rural Development Department (RDD), the main deficiency is the lack of an expansion plan after the piloting phase; secondly there is no allowance for the political environment and inter-departmental sensitivities as some department in the Ministry of Agriculture and veterinary services consider the pilot projects trespassing over their specialties. Regardless of that the activities of the RDD stirred the calm waters of Darfur technical departments.

For the department there short lived successes in cheese manufacturing on the basement area and bee-keeping in the Kabom territory as early as 1979, building on existing systems, in that the department was an initiator country wise.

THE EARLY PHASE OF JEBEL MARRA:

The name project originated from a chargeable heading in the central budget of the Horticultural Department, the domain of the project is the massif itself, served from three centres at Zalingi, Nyerteti and Kas. Since the British days, administrators, the native administration, migrant merchants and the technical staff of the Ministry are leading figures in innovation, within the

context of local irrigation and rain-fed culture, top officials in the Government facilitated acquisition of tree seedlings and animal drawn implements.

Mediterranean fruits and gardening started to spread and towards the end of the 1960's potatoes were introduced in the Nyerteti area and spread to the north. Produce is siphoned out through camels in rough inaccessible area and through trucks from Nyerteti.

An important development is the coming of FAO in 1967 with a team of experts to study the Jebel development prospectus; Formal project structure came in around 1972 when TESCO Company was asked to develop Jebel Marra. Detailed studies were made with a conclusion that transport was an impediment to development and earthen feeder roads were constructed, vegetable haulage through the railway had to be improved and expansion into irrigation through tapping ground water in favourable places. These ideas were subjected to intensive brain storming in open discussions at Zalingi.

This development came concurrently with the coming of the Tobacco Company working in the Virginia tobacco, facilitated through a newly established Agricultural Bank, extending credit to well digging and financing tobacco operations. As seen in 1976 many of the tobacco farms wells stayed half finished as loan disbursements are tied with the level of execution; part of the credit was used for other purposes.

By 1976 the water resource potential in Jebel Marra was utilized to the maximum, the cultivable land up in the massif reached its limit, irrigation from deep wells at Dankuj resulted in salinity of the top soil, the tobacco business suffered from lack of transport and credit problems, expansion of fruit gardening settled to transplanting from farmer to farmer because the Horticultural Department lacks the necessary resources and support, resulting in a low quality produce. Feeder roads proved successful in linking Zalingi to the border leaving the segment Nyala/ Nyerteti rough as it was to be filled later by the Nyala/Kas Zalingi tarmac road.

By the time of project completion, the project HQ was established linked with short wave receivers to out stations and Khartoum, and a fleet of earth moving machinery and a drilling rig.

MECHANISATION:

Environmentally, symptoms of dryness started to appear in the Jebel, many of the perennial streams dried out and livelihood was continuously shifting to the plains. Food gaps started to pop up after 1975. In a sudden move, President Nimairi in 1976 decreed at AlFashir, Mechanized Farming Corporation should have presence in Darfur before the end of the year; hurriedly the Khor Ramla near Nyerteti was chosen and heavy machinery was employed to clear vast areas of Acacia Albida, failure was inevitable as the soil proved to be too shallow to support mechanization.

The other location was Um Agaga in the Eastern District which suffered for being un-accessible for the required manual labour force as being remote and isolated. The state farm (10000 feddans) was kept active through letting to private investors. These constraints were thought to be augmented in a substitute to the north east of Buram, but it did not materialize as the drift towards mechanization is reconciling.

The resultant effect of mechanized farming is the spread of tractors, formally backed by the Regional Ministry of Agriculture, some- times, in un-favourable locations. Formally locations in Wadi Azom (mainly Habila in western Darfur) were planned as mechanized projects and pockets in Wadi Salih, both in Western Darfur, other locations in Buram district were ear marked but not much was done.

LAND USE SURVEYS AND PLANNING

In response to the 1964 drought, FAO, called for supporting the African Savannah Belt; the Sudan was chosen to pilot in combating desertification and famine mitigation. As a link, an office was established in the Rural Development Department.

The British Government selected an area though to be resource endowed to experiment in land use planning bounded by latitude 12 deg. N and long. 28 and 29 east, termed (Southern Darfur Land Use Planning Survey) 1972-1974. The surveys east of Longitude 29 were carried by FAO, termed (Savannah Development Project Phase I) covering the area east of 29 E. to the Ethiopian border. The two surveys were launched in 1972.

The sheer size of the FAO project, (SAVANNAH DEVELOPMENT PROJECT) related to the number of experts employed to carry-out the survey had much influenced the quality of work.

For HTS, with the aid of new photography and mosaics; the general work space was clearly discreet parcels best suited to a land system format. The second step was to gather field information on each land system including production and constraints. The third step was to project these findings in an inception report; at this point came the deviation from projects blue print; the inception report was distributed as (Working Paper No.1) for intensive discussion by Government Staff and Donors. These series of working papers built up to produce the final report.

With the in-depth investigation covering the whole range of data needed for land use planning, and agronomic preliminary experiments to evaluate the performance of the traditional production systems; came the important step in deciding to re-orient for a development plan due to the nature of constraints in the area, perceived as system components.

Key issues perceived in the development plan are:

-Given the range of constraints and the level of technology in rural Darfur, traditional production is rational, based on research findings.

-Land use needs to be re-organized, people had to be re-located from degraded areas to be resettled in virgin lands; abandoned lands need to be handed over for rehabilitation. The Government had to adopt a hard line before things go astray.

-The Nagaa Land System potential had to be exploited through introduction of suitable machinery.

-Agronomic and veterinary research should take the lead in crop and animal production.

-Experimentation on communal ranches at dry season well fields (two sites)

-There is a potential for shallow well irrigation, but there are limitations with respect to the nature of the aquifer.

-Introduction of intermediate technology

These highlights are a blue print for any large development project; the more important is how to go about it.

The general format of the development plan was acceptable for the Donors and the Government, hence, FAO contracted HTS to continue with the Savannah Development Project; phase two to cover Darfur (1974-1976), phase three will be Kordofan, and the last phase for the Blue Nile.

The work out-come on the Eastern District was similar to that of Southern Darfur, accordingly, donors recommended the amalgamation of the two documents in **one development plan**; summarized in the following:

-Establishment of an executive agency to be called Western Savannah Development Corporation.

-Establishment of an independent Western Sudan Agricultural Research Station with a different mandate

-Establish an animal off-take facility to siphon out excess livestock to relax to degraded range; later transformed to LMMC.

The loan requirement stipulated enactment of laws which were passed in 1978, awaiting financial facilities from the World Bank, ODA and IFAD.

In 1976, FAO contracted HTS to do the same exercise in Jebel Marra, the conditions in the massif were deteriorating; HTS suggested re-orientation of the project to be the Zalingi Council Rural Development Project , with main thrust on research, extension intermediate technology and credit. WSDC and Jebel Marra Project operate under the same law.

By 1978 the thrust of rural development had faded out at the international level:

(1) The World Bank suggested to the Sudan Government two alternatives, either to abandon the project or accept a project within the limits of 20 million Dollars

(2) When the reduced project was accepted, the Regional Government insisted on solving water problems first, or, it is not interested in the project.

This stale mate was resolved in favour of the Regional Government and finally the project was re-written and Launched in 1980; the new format settled into the collaborating Agencies including NWA, RPA, VET DEPT and the Diagnostic Laboratory. The bulk of the budget went to water yard rehabilitation and equipment. In the first phase of WSDC the issue of cost recovery to sustain water services was enabled but reluctantly by the Regional Government. The internal political sensitivities between North and South Darfur played a decisive role.

There are two issues of concern to Donors, firstly the problem of land tenure with the understanding that registration of deed would increase land value and inter-alia assist in resource

conservation. For this purpose a consultative study at the national level was launched. For land tenure it came with the finding that customary land tenure is not an impediment to development.

The second issue was privatization of services especially in Nagaa ploughing, but they were convinced that the time is too early for such an initiative. Privatization of veterinary medicine had already started.

The Jebel Marra project was progressing on the same line. The project activities focused on adaptive research, extension and credit. The main difference is the way credit was supplied, in the Jebel Marra it is a direct relationship with the Agricultural Bank as land around streams is a bankable credit worthy asset; in WSDC sandy areas the collateral was a problem; hence credit was guaranteed by WSDC and administered by the extension staff, the community guarantee was acceptable as a working principle if administered by WSDC. After the initial stage, the ABS adopted this format as a policy which was implemented in other credit projects.

The level of achievement of WSDC in the first phase commended an extension into a second one, this time majoring on agriculture, though the other components were equally important. The contingency fund helped in creating a fully equipped diagnostic laboratory with a capacity to serve central Sudan and the neighbouring countries in vaccine production.

By the year 2000, wadi development in Jebel Marra project was in full fledge, almost all areas of potential for irrigation were producing served by a web of extension services and credit. Onions and other crops that used to be imported from the east are now produced locally and potatoes from up hill with improvement of transport are marketed outside Darfur.

Internally, there are themes to be highlighted, quite important to lessons learnt:

*The intermediate technology activities of WSDC headed towards a public uptake, in Jebel Marra fabrication was based on contracts with scope for local manufacturers to replicate, the important difference is that contracted products were supported by ABS.

As early as 1960 there are prototypes of animal drawn implements in Nyala, Zlingi and Kas similar to the ox- plough. A shrink of this model was developed; WSDC was to provide the material and local blacksmiths were trained to fabricate the product. The success of the donkey plough induced an expanded fabrication process. By 1993/94 Nyala local workshops were producing within the range of 8000-10000 ploughs. At present this plough can be seen in Western Kordofan and in the neighbouring Chad. For the seeder/weeder, time run short for promotion but found it's way to west Africa.

*The adaptive research managed to screen about nine cultivars of millet, sorghum and groundnuts. The major break-through is the joint accountability relationship between adaptive research, extension and management to reach a target of 4000 tons of improved seeds per year which resurrected the 1950's team spirit. All the input was provided through the extension network, to note that the extension agent whether native or coming from outside is part of his society which reflects the sense of commitment.

*Rice and fodder seeds nurseries were found north of Radom, this was a continuation to the 1974 recommendation and feasibility study of a rice project at Bute Raya in Buram District, there are enough signs of success as thought to be an alternative crop for narcotics.

For both WSDC and Jebel Marra, the range of inputs supplied is similar; the difference is in the mechanism of dissemination, sources are either internal or closely supervised.

*In Range improvement, the community grazing models were quite successful on the Basement Complex soils. The important prerequisites behind the success; there is a felt demand and that; the local community and nomadic community are to agree on the boundaries and use regulations. Within the communal boundary WSDC would work for fodder and stock improvement.

*The other initiative is the introduction of (fodder banks), targeting villages on sandy soils to the south. Imported Australian perennials grasses were multiplied and distributed through fodder banks within cultivator's fields at different localities. Seed multiplication was successful where a limit of 400 kilograms was reached; the a potential was seen in the experiment but the full evaluation was handicapped by the liquidation of WSDC

*Resettlement was the most difficult issue where the twinning was not possible; population drift to the south was intensive, meanwhile internal politics played a decisive role in sizing the resettlement program. 400 families were to populate the demarcated area with allowance for residence, cultivation and a grazing buffer in the surrounding; the controlled settlement would be run initially by a WSDC staff and gradually the management would be devoluted to a settlement committee. Agronomically, crop and land rotation would follow the traditional format until research would come with results that assist in increasing production and productivity and limit expansion. However within the expected stability limit of 20 years research results did not materialize. The system devised to run the settlements is closely similar to the law of the People's committees for salvation and Development where committees are to administer community financial resources which ran intact for some twenty tears as part of WSDC institutional development programme.

*Revolving funds were established with NWA to run water services, and with the veterinary department on drugs. NWA and WSDC are closely related to maintain a smooth functioning of the revolving fund, with the veterinary department there are some difficulties who up to then consider drugs as a domain for the department; that however built with others for the privatization of veterinary drugs. The concept was expanded to the settlement management committees. Toward the active lifetime of WSDC a proposal for financing the agricultural services through a 500 million Sudanese pounds was forwarded, participants include WSDC own resources, the ABS and the Regional Ministry of Finance as a representative to the local government. This did not mature though the main actors are ready.

IFAD and NGO's projects

About the mid-term of WSDC second phase, bottom up approaches were in the fore front, especially after the 1984/5 famine triggered by famine destitute. The proposal of WSDC is to approach this issue in discrete parcels capable of being replicated. The suggestion was to start with Kabom area and Um-Kaddada area in Darfur; to the local politicians it is not acceptable to concentrate on a

periphery and leave the head quarters and hence the project was expanded to cover the Idd Elghanam Rural Council (Idd Elfirsan lately).

IFAD policy towards the mandate of the project was clear. The services provided by ADS in Um Kaddada and Idd Elghanam were relaxing the production constraints as felt by producers in terms of inputs; some work is necessary to put it in a bankable format, in that it is answering the why these inputs are given the priority, the second phase of the project is a consolidation period building on existing institutional frames. Themes and interventions are worked out in close collaboration with the targeted communities

At the regional level and since the late 1990's, the interventions were on a programme format capitalising on institutional linkages infrastructure; covering animal production services facilities to include training of veterinary assistants, revolving funds, veterinary dispensaries and rehabilitation of open water sources; other programmes include public health, feeder roads, credit facilities and gender related issues with a scope for assisting localities. IFAD works in close coordination with other donors who target specific interventions. As agreed with the Government IFAD is active in areas affected by wars.

For NGO's in general, they are quite cautious with input supply, recommendations are sought from authorised Government agencies in terms of quality and source.

There are several initiatives being reared by Aid agencies; rain water harvesting in Northern Darfur and lately East of Jebel Marra areas in the form of diversion terraces and bonding is an important activity in Darfur. SCF worked in Um Kaddada in restoration of traditional techniques in grain storage. One remarkable achievement is the development of horticulture in the Wadi Kutom, lately devastated by insurgency movements.

The outstanding remark is that revolving funds seed money credit facilities are parallel funds within the ABS whose role is to administer. Once these funds erode, gradually the whole process ceases.

REMARKS ON DARFUR PROJECT INTERVENTIONS:

*The mandates of projects is not uniform to allow for a comprehensive development

*Equally important is the coverage, with rural development projects the scope for development are pilot experiments to assess explicability touching on various land related issues. This applies to land use projects, service oriented or piloting projects.

*For both National and Regional Governments, Projects are isolated islands. The policy dimensions of projects are rarely discussed, airy phrases; it makes a difference when speaking with Governments about increasing food production and depletion of the natural resource base. There is a language barrier.

*Regional, and National Governments are not initiators, projects are additions; once funding ceases projects collapse.

*Policy wise a manageable existing problem over-rides anticipated drastic problem under the illusion of things will improve. This is particularly important for land related issues and social development.

*Project interventions that touch with tribal domains should be taken with due caution; regardless of the jurisdictions of the Un-Registered Land Act and the Local Government Act the interference is politically loaded. In Darfur it was responsible for aborting the rotational grazing and did influence the settlement and range programs in WSDC.

*Very few projects worked for continuity

*For both WSDC and Jebel Marra, liquidation or scaling down could have been avoided if they cared for image enhancement beyond its regular cultivating beneficiaries. Secondly it did not care for a (carry with) or a buy in approach to politicians.

*there are general remarks important for policy dialogue, not specifically related to Darfur but had influenced projects and projects policy

1)One of the most important findings of Darfur Development Projects is the (single focus) of development input.

For WSDC and Jebel Marra since 1978, to go ahead with a parallel institution or reorganise the existing agricultural departments under one umbrella was left open for a Government decision. No decision was taken probably to consider projects as fund traps; the resultant effect is to fall into the interdepartmental sensitivity/jealousy trap in continuum to the line of Kamil Shawgi/Bayoumi etc. Since the late 1950's 1960's; up to now this factor is responsible for the current policy crises.

2)The three partite strategy for Western Sudan, (research, livestock off-take and the executive agency), lost focus once the three functions were set apart. This segregation is embedded in the cyclical nature of power within the Ministry of Agriculture. At that time Research and Mechanised farming were strongly supported by the World Bank; the worst repercussion manifest in depriving the Ministry's staff from updating knowledge; higher degrees were only considered for research and university staff, further aggravated by job ratification stipulating who is more important than the others- it is the time when agriculturalists adopted an engineering capability.

3)In the second half of WSDC life it opted for systems complementarities, within the controllable part, the adaptive research, extension, intermediate technology and settlements are one circle, some success was achieved. On animal production, the diagnostic laboratory, immunization, veterinary revolving fund and range improvement are an-other circle; not much success was achieved in terms of reciprocity of the different components; research centralization was one of the problems and the reluctance of the central veterinary authorities.

THE MAGNITUDE OF ENVIRONMENT:

This encompasses the physical environment, soil, water and vegetation:

*For all interventions, the general trend is the (to live with) situation, where land related issues are politically loaded.

-The resettlement programme was intended to stabilise land use on virgin lands as a substitute to degraded lands in the north, which in turn will be rehabilitated. By the time of drafting the development plan in 1976, Darfur land reserve was intact in Goz Maaliya, Goz Dango, Abu Zureiga, and Goz Sasilgo in the west. Then things went dramatically to the worst, by 1984,the whole of Abu Zureiga, Goz Maaliya and at least 75-80% of Goz Dango and Sasilgo were consumed.

The procedural arrangements in settlement and settlers selection were carefully worked with the councils and tribal authorities; even with that the settlement programme could avoid inter and intra-tribal senilities as most of those in need are in migrants at a time the North/South Darfur cleavage line started.

With that settlements were isolated islands but served as a captive audience for adaptive research on land and crop rotation, extension packages of improved seeds and intermediate technology and fodder banking. Management design in a controlled system was successful, it remained to test these principles in an open system through what is termed (development areas), land envelopes around a service centre.

In multi-donor, multi company projects problems may crop up, the British supported HTS was substituted with the World Bank supported AACM.; this substitution was followed by change in emphasis from resettlement orientation to managing grazing and browsing resources, importing Australian grass cultivars for multiplication and Prosopis (miskeet). The multiplication programme beyond doubt was successful with a capacity to inject a minimum of 400 Kg per year, that however went un-noted; the energy of the production centre dwindled with the collapse of WSDC, both research and Range authorities failed to continue with the initiative

-Related to the above is the forestry (and horticulture) component; tree seedlings nursery set up was established across the southern half of Darfur. It is important to note that the activity of these cells induced a parallel activity in Forestry Range and Horticultural departments. Sometimes the presence of a catalyst is important.

-The basement complex land system had the enteric problem of a continued degradation as a result of being traditional rainy season grazing, in which nomadic and transhumant producers equally suffered. As the phenomenon was too broad WSDC targeted the easier manageable sector of transhumant production.

The communal grazing in WSDC was experimented in three sites; the strength of the programme is in the mutual agreement between the Nomadic community and the sedentary livestock owners on boundaries and management procedures. What was done is invoking traditional sanctions without enforcing a solution.

With the completion of fencing, WSDC role was to manage the degraded range resource and improve the stock quality

Earlier attempts of the Soil Conservation Department and FAO projects did not materialise, for the first it did not take into account the local politics and progressed in a purely technical orientation. The FAO project was stuck from the beginning in the conceptual framework of settling nomads on the basis of rotational grazing. The convention of rotational grazing is common to the Soil Conservation and FAO.

-In Darfur, water is a limiting factor for crop production; traditionally water availability is a regulatory factor in land systems.

Rain fall conservation was pioneered by the soil conservation around AlFashir in simple raised terraces; rain fall use efficiency was not investigated until mid 1980's when a planning unit was established to assist the Darfur Regional Government by the British Government. The activity of this unit had widened the scope for rain water harvesting; the step had a set-back in staff change over but continued since then as an important activity for NGO's and the Regional Ministry of Agriculture and expanded to the eastern reaches of Jebel Marra.

By all means the work is successful but apparently there is no comprehensive plan for expansion.

-Land reclamation targeted the Nagaa land system of South Darfur, an idle and dormant resource. The idea was borrowed from the Gardud experiments of Kordofan where the chisel plough was used; a sub-research station was established mainly for that purpose.

Once the technique was proven, much of the lesson learning is embedded in promotion; a gradual approach towards mechanization was adopted; started with ploughing at no cost which attracted one person at the start; tripled next year and then started to boom; the next stage was a subsidised service giving way to establishment of service centres and privatisation where possible to communities.

The soil conservation department established a centre for reclaiming basement soils; the initiative was borrowed from the early Kordofan work on Gardud soils around Al Obeid. No actual work was done; the soil conservation department was handicapped technically and financially.

Throughout the past twenty years NGO's are active in provision of social services; rehabilitation, stocking and training are important components. The activities of WSDC were limited to settlements within the comprehensive package of human settlement. Social studies indicated that internal socio/political problems start with provision of private enterprises, the flour mill and shopping facilities; this gap was filled by availing credit to the settlement cooperative as a tributary to the settlement council.

BIOMASS

There are main themes or issues and initiatives:

*A sample of 3000 heads of cattle was analysed covering herd structure, ownership and management; revealing the optimality of composition, secondly the polarisation of livestock ownership and at the same time the in continuum relation-ship between migratory and sedentary herds; it point to the fact that isolation of one group from the other is fictitious.

*With the aid of recent low flight aerial photography, the stock routes were picked which shows beyond doubt that the stock-routes are nodal in nature and not lines. The general convention of eastern or western stock route is erroneous. Donors of WSDC used to insist on demarcation; confronted with the realities, this issue was relaxed. Traditionally crop and animal production were

harmonised until the enactment of the Unregistered Land Act of 1972 and the change of rule structure.

*The complementarities between the newly established diagnostic laboratory, animal health and animal production were hampered by the severe centralisation of research and veterinary authorities at the centre. With research in general this issue is dealt with in accordance of Union's format rather than policy format.

* For animal production the veterinary authorities did not decide on the type of animal to promote as a policy, the white cow of the west is internationally recognised as one of the best meat layers. What is understood is that vaccination is the priority.

*As early as 1976, the importance of rehabilitation of the silted water sites was recognised and recommended on pure environmental perspective, but not followed; currently this same theme is a political issue with the separation of the South. It is likely that the time horizon of decision makers is too short.

INISTITUTIONS AND TECHNOLOGY TRANSFER:

*Work through collaborating agencies as an operational criterion was successful; it has the potential for programme orientation as a substitute to project format. The perceived problem is in locating the core unit, in donor's funding it has acceptability but blurred in government funding; there is an obsession with line command and less on the team leader concept whose place is a back-up and facilitator for the technical agents and not

* Project experience demonstrated that, the joint accountability of research, extension and management was proven to be the most effective operational criterion. Central Research operate on the principle, take it or leave it or, (recommendations); it is for the extension services to pick and promote.

*. The very important notion in project operation is that the research staff and extension staff are themselves cultivators as a management directive.

*Proven products of intermediate technology can have the best chance of discrimination if the local manufacturers were assisted to fabricate. This deviated from the convention of privatised.

*Achieving a broad fronted breakthrough is not possible because of variations in environment. Adaptive research and intermediate technology can fill this gap but incrementally, the Darfur experience shows that a 15% incremental benefit can be achieved with improved seeds and aerial expansion can be doubled or tripled without extra load on the subsistent farmer's resources. An expansion plan is vital for adaptive research provided that there is a commitment and joint responsibility between research and extension

*In Mechanisation: The main concern here is the farm machinery and crop protection machine units. It is assessed that given the present level of technology, the traditional system had reached the top ceiling; hence poor farmers are to be assisted with new technology to abridge this constraint if they are to be food secure.

The current paradox is to how to deploy machinery units; teachings of farm planning and control recommend a minimum level of land unit with due consideration of efficiency of time use; which mismatches with poor farmers circumstances, and at the same time there it is a necessary. The national experience indicates many failures in this respect.

The Darfur experience is indicative for alternative approaches, firstly the interventions are goal oriented regardless of the means; the soil conservation in the Late 1970's embarked in bush clearing for cultivators to expand irrigation around Nyala Using a D6 bulldozer, which is any way idle; the effect was remarkable as approximately 5000 feddans were opened for irrigation, Darfur now is approaching self sufficiency in onions.

Reclamation of Nagaa soils followed a different magnitude where settlement pattern is dispersed within the Nagaa land system, the procedures are to arrange beneficiaries in circles to receive the circle, all of them are new to ploughing Nagaa and use of tractors. The approach was to start at no cost and gradually introduce cost recovery; if it is felt that a group is mature enough to run own affairs the machinery would be privatised to the group. This orientation could not avoid the management trap, in the second phase of WSDC Donors deemed that WSDC problem is management- which by then is an international paradigm in line with structural adjustment etc.; the orientation was relatively shifted from the beneficiary as a target for the whole intervention to the operation of the machine, it did retard the expansion but not to liquidate it as supporters of any of the two orientations have to arrive at a central point. It is to note that the WSDC act is quite flexible to manoeuvre with various issues.

*Credit

The question of credit was raised some time by Donors supervision mission to WSDC management, the answer received from the Head of the Agricultural Division is that we call it (deferred payments), which capitalise on personal relations more than the impersonalised image of credit.

The deferred payment principle of WSDC holds true for traditional lending system, it differs only in the margin of profit levied by the money lender. The problem of the principle is the extra load on the extension staff if they are ready.

*Linked with the above, revolving funds as operational criteria were successful in both Jebel Marra and WSDC. It matters much what principle it adopt. As credit, revolving funds as an institution suffered on equal footing with the development committees as being the chosen channel for the Government; in all respects democratization of the community is an illusion. This notion is quite important for service oriented projects which impinge on sustainability.

THE KORDOFAN DEVELOPMENT PROFILE:

The distinctive feature in Kordofan is the presence of development domains, the Nuba Hills block where cotton and mechanised farming dominate, the Goz soils where oil crops are of special importance nation wise, the animal production sector which is paramount in the southern districts and the gum belt.

The spill over of each domain on the others is evident especially in grain, oil and meet supply; tracing the food chain is difficult, but the damping effect of Habila mechanised farming is clear at Al Obeid and AnNahud, there are stringencies in food security but not to the level of food gaps; Income is a main concern. This relatively relaxed situation explains why the region in general did not host projects of size; up to now there is a land reserve or pockets to be filled, but the overall magnitude is towards escalation of security problems. The Nuba Block was made to reach crises through the introduction of mechanisation; revising that policy is taking two steps forward and one step back while the time is running short.

The speciality of the northern Goz are oil crops and gum Arabic with sheep raising mainly on the west, the three activities are not substitutes but complement; the southern belt is dominated by migratory livestock though crop production is increasing rapidly since approximately 1980, expansion on intertribal buffer zones lead to the rise of conflicts; the Nuba Block is a discrete envelope of its own, cotton used to be the most important crop, through time mechanisation came to the fore front, the thrust of this shift, from small farm enterprises to large scale commercial producers left a negative residual on land-related issues including public resentment, original settlers and nomads alike.

This mosaic had influenced the nature of interventions, or possibly deferred the cause. Another important aspect is the turn back of donors to the rural development approaches which are broad fronted; the time factor was decisive where the major donors (FAO and WB) have commitment in Darfur.

The shift towards the community based got strength after the 1984 famine; development and tools were rethought; the IFAD and NGO's mandates followed the bottom up approach and after 1989 almost all DONORS targeted beneficiaries more than scrabbling with issues of land use and tenure, the nomenclature of Project as a header is maintained. Whether fund allocation for a specific intervention qualifies for a project is a question

Current themes as described by, Khalid in an IFAD research in Kordofan:

A focus on community empowerment and capabilities, whether separately or in combination, is becoming rather common in recent development literature, whether academic or practice-oriented (see for example Narayan 2005; Stern, Dethier, and Rogers 2005; Alsop, Bertelsen, and Holland 2006; and, for the centrality of capabilities in a certain kind of development thinking, Sen 1999). This is largely due to the growing popularity of a holistic understanding of development as a process that requires the empowerment of vulnerable stakeholders, rather than merely quantitative improvements on conventional indicators like income, literacy, productivity, or nutrition. Most donors

now agree that promoting development requires empowering those who are supposed to be not only its beneficiaries but also its agents, although there is a certain lack of clarity about what exactly this may entail, let alone how to go about it. Theorists and practitioners of natural resource governance, community-driven development, and resource-based conflict management have perhaps particularly stressed the importance of empowerment for developmental impact and sustainability (see for example Castro and Nielsen 2003; Buckles 1999; Hamilton and Dama 2003; and Means et al. 2002). In addition, the non-instrumental value of empowerment as a developmental goal in its own right has been articulated in the literature on livelihoods, human rights (including the right to development), gender equity, and the role of good governance for development (see for instance Sen 1999; Moser and Norton 2000; Eyben 2003; and Alsop 2005).

Starting from independence up to now there are many actors on the Kordofan stage:

MINISTRY OF AGRICULTURE:

The 1958 experimentation of the ministry focused on Goz mechanisation at Abu Zabad, similar to that of Gureida in Darfur, with the difference that land was not registered and Gazetted, the causality was unknown, but once the results were obtained the site was abandoned.

The other site was on the Wadi Shalango flood plain at nNama; early technicians of the ministry at Lagawa stated that rice was quite successful; the name of the cultivar (Natal) indicates a South African origin.

There are some efforts in rehabilitating the gum gardens in Um Ruwaba district, this was hardly authenticated but mentioned to a Soil Conservation team.

For both Kordofan and Darfur, these short run experiments ceased, apparently there was much faith in FAO to guide the way to development.

SOIL CONSERVATION:

Initially the residual of the late Land Use Project was continued on gardud soils, a replication of the findings with no plan for expansion. With the construction of Al Rahad earth embankment on Wadi Abu Habil a vegetable production farm was established using the excess pond water, to note that in Darfur the same exercise was done in the wing embankment hafirs.

The two pilot projects of specific importance are the Gereih Elsarha wet of Um Badir and Babanusa project both targeted the settlement of nomads. There are basic differences in modelling the project on ground.

GREIH ELSARHA: Under the general drift towards the settlement of nomads the project was launched in 1969, FAO was not far from the scene and Shiraz international conference on nomads and nomadism. The Kawahla community of Wadi Al Lagadab was approached and came to agreement on the size and procedures. The area would fenced and closed for three tears and a cooperative membership would be the beneficiary of the project, the question of the carrying capacity would be dealt with on pure technical grounds, annually, the ground cover was mapped :

-Fencing and restriction of use for three years showed dramatic results where it was reported that some types of Kitir which were not seen in the last 30-40 years re-appeared. The results of the surveyed ground cover were problematic; the methodology of the transit lines, hoop and loop readings were continually taken for about ten years, the Soil conservation was deficient in statistics to deal with these figures; technicians are keen in taking the readings but an expert back up was lacking. This problem holds true in the past as well as the present leading to guess work on carrying capacity.

-When coming to admit settlers within the project, the ownership of the 50 members exceeded the capacity of the site, some measures were taken in favour of the project (physical) but not the beneficiaries. It shows that there is a conceptual error about the nature of the grazing system.

-Rules of cooperatives have limits on the membership, the 50 ceiling; it brings forth the question of egalitarian perception or taking into account the community as a whole, additionally the 50 pounds levied share in the cooperative imposed restrictions to many. At that time there is a ministry for Cooperatives and Rural Development.

-The project since inception did not escape the inter-tribal local politics trap, as the chosen area was said to be a shared resource for more than one tribe.

BABANUSA PROJECT: The rationale behind the project is the possibility of supplying Babanusa Milk Factory with milk through organising nomads to settle around; the area was known to host the cattle wealth of the Meseiriya nomads, the ideology leans heavily on Cunnison's work, The Baggara Arabs. The decision on the number and size of settlement is a desk work, on a 1:250000 ordinance survey map, rectangles were drown around the unpopulated water-yards – to be demarcated on ground, each to be a settlement project; the design is an expert opinion.

-The design errors were clear in retrospect; the area is a transitional rainy season grazing with sparse ground cover.

-In the dry season the nearest location for the nomadic herds is Bahr Al Arab far away from Babanusa.

-As a settlement many of the targeted beneficiaries settled as spontaneous cultivators looking for the secured water resource as being taken care of by the Government.

-FAO joined the Soil Conservation in one project where an expatriate was stationed to do some research.

The final image of the resettlement project came as continuum to the spontaneous settlement which was progressing south.

LAND USE PLANNING:

With funding from FAO, a land use project was launched in 1962. The greater area of the project lies in the (difficult area); part of the themes of the project is to work for alternatives to water provision, crop and range management and a land use plan.

On nature water availability was a regulating factor across the projects area where most of the area is over basement, the rainy season grazing is mostly confined to the hard surfaced Gardud soils that do not lean to traditional ploughing techniques and hence open to migratory stock.

-With this setting detailed cartographic work was produced in an album showing the distribution of various activities. It is not a land use plan parse suggesting defined actions; cumulatively the surveys highlight the range of interrelationships and the hierarchy of services. Probably donors are aspiring for an action plan and recommendations.

-The search for relaxing the water problem; it seems that local experience of excavating Tebaldi was accompanied; models of under-ground tanks were constructed using a mixture of sand, cement and polythene bags. The technology was simple, but this initiative ceased with the project termination. What can be inferred is the single dimensional thinking, water storage facilities are badly needed across the whole of the Gum belt and this technology could have been a substitute to metal and concrete tanks. However it took more than 40 years to be resurrected as low cost building material.

-Research on Gardud reclamation introduced the chisel plough and sowing in the farrows; this experience found good grounds in Nagaa reclamation in South Darfur.

THE NUBA BLOCK:

The Nuba Block was overwhelmed with cotton and mechanisation, the development scenario of the two activities furnished grounds for a range of problems that triggered successive project initiatives to resolve without much success.

The Nuba Mountains Cotton Corporation was established in 1924; activities are mainly providing seeds and ginning cotton. Cropping is traditional; burn and slash method. After the boom of the early 1950's, productivity and prices followed a downward trend.

In 1967 the organisation was transformed to a Public Corporation for Agricultural Production (PCAP) to promote modernisation programme based on providing mechanisation to groups of farmers, the objective was to promote cotton production. This period witnessed the beginning of the drift towards mechanisation. The Mechanised Farming Corporation was established in 1968. Its first and largest scheme in the Nuba Mountains was at Habila; it seems logical that the two corporations compete on this issue as a sign of modernity

The approach of the two organisations towards land differs; The MFC legally based its operations on the Land Registration Act of 1925 and the corporation's act of 1978 as a central authority, it had enough political support in the early phase to survey, demarcate and execute.

The deterioration of cotton producer's returns was felt since the early 1960's, as a counter measure the Corporation opened new weighing centres in closer proximity to traditional production centres. The collapse continued to the effect that many projects began to close in the late 1970s. By 1976 the

Corporation's headquarters at Khartoum positioned a capable manager to rescue, but ironically he opted for full independence, and an expanded plan of mechanisation

The modernisation project of the PCAP targeted blocks of land near villages, in many instances are village lands and demarcated as project. The set rules of operation for cultivators are to clean the land and perform other cultivation operations and the Corporation would provide the ploughing services and seeds. Many villagers understood they have freedom in crop selection; to discover later that Cotton is a must. This by itself is a manageable; but the problem is the committee of the mechanised department; any violation of the rules would lead to the loss of entitlement to the land. Additionally under the rules of the ABS, it was not obligatory that land was registered, but a license was necessary which needed to be renewed every year to avoid being pushed off the land by the Committee of the Mechanised Farming Department

Whereas the ABS was taking that measure, prior expectations of loss of entitlement were perceived by many.

As a result many farmers were pushed outside their land. For cultivators, the profitability of cotton was doubtful, and the alleged legitimacy of the Corporation rests on cotton; responsiveness to market signals upon which mechanisation base itself is out of question.

In 1976, HTS after finalising the development plan of South Darfur, the next step is to shift to Kordofan, presumably backed by FAO. However the Ministry of Agriculture was on the understanding that there is enough dispersed data to qualify for drafting a development plan for the Nuba Mountains; a HTS team member was assigned the task of compiling all written material on South Kordofan, which he did in a pamphlet size document. The orientation was passed to Donors; on that background a conference was held in Khartoum in 1976 to openly discuss issues.

In an advance step; Donors had their coordination meeting abroad and came to the conference with pre determined contribution; the Germans will fund mechanisation in Dilling, Kadugli, Lagawa triangle(GTZ); the British will fund a land use survey (HTS)and the EEC will fund modernization of the traditional rain fed farming (The French SATEC design)

For the GTZ it embarked into research and surveys of the area producing valuable information on farming systems; conducting on farm trials of optimum crop rotation and land preparation strategies and with it, the Shalango plains were open for Mechanisation.

HTS replicated the experience of Darfur – land use- except that the frequency methodology to quantify vegetative cover was not possible as in Darfur the landscape was open compared with the hilly nature of the Nuba Hills. As with WSDC, HTS was to give way for AACM as the favourite, then, for the World Bank. The input of the two companies found limited circulation except being quoted on a limited scale.

The EEC project, with consideration of the performance of the Nuba Mountains Corporation recommended a parallel organisation; there is a shift from mechanisation to intermediate technology.

The Nuba Mountains Rural Development Project, which ran from 1979 to 1992 with EU funding, tried to encourage the use of animal draught and other appropriate technology, the effect was hardly felt in improving farmers living where the root of the problem was not touched.

There are many surveys that describe the production system in the Nuba Hills; there is the hill catena on which the villages were built, the loamy and sandy clays of the streams and the cracking clays far away from the village; each has a set of equipments and crops; for the first hand tools, in the second animal drawn implements are the most appropriate at wet times when the clay soils cannot be reached, the clay soils are the traditional slash and burn areas and not all soils of that sort fit. The important point is the complementarities between the types.

ABYEI SPECIAL PROJECT:

As a former staff of Harvard University and Minister in Foreign Affairs; Francis Deng persuaded the University and American AID to develop Abyei as a deprived area. The study commenced in 1976. AID was looking for capitalising on an intermediate technology interventions which was not acceptable for the beneficiaries; the overwhelming demand was for tractors. The adoption rate for animal drown implements at the end of the project was minimal with no second phase.

MECHANISED FARMING CORPORATION:

Mechanization was started in Eastern Sudan during the Second World War in 1944/45; pilot work was started in 1958 to study the problems of mechanization; the share of the Nuba Mountains is Habila; since then the progression of mechanisation was getting momentum. From the first instance the site of Habila was the convergence point of as many as four stock-routes.

The Mechanised Farming Corporation law was enacted in 1968 sanctioning the beginning of a government policy of encouraging mechanised farming. Large scale mechanised farms were to be allocated in lots of between 500-1500 feddans. Under the act, 60% of land was to be allocated to local people and no-one was to have more than one farm; this principle was violated from the start and by necessity, the local people cannot meet the pre-conditions of allocation.

Various forces were acting to increase the land-grap; firstly the MFC own account, then came the jealousies of the People's Local Government to increase local revenue through leasing projects, liquidation of the traditional leadership placed the decision on land into the local level institutions whose vision do not exceed the direct surroundings; then came the final blow from the Investment Act.

* Mechanized Farming deprived cultivators from the most important resource they have, clay soils, under the misconception of being vacant - as seen in the dry season.

*Though the environmental viability of the current mechanisation format was assessed as negative:-

-The will to revise is lacking; technicians and politicians are equally passive in that respect.

-For the administrators, the status enjoyed at the local and national level rests on implementing law; a project lease is a legal document, it is the problem of politicians to decide.

- At the end stage, vested interests are policy determinants.

The situation with respect to pastoralist is summarised as:

"The same awkward situation applies to the nomads who lost their traditional grazing lands, water points and animal routes to the schemes. It is estimated that 80 per cent of the 350,000 pastoralists and agro-pastoralists of Southern Kordofan province are seriously affected by the expansion of large-scale mechanized schemes. This is mainly because the owners of the schemes do not abide by the agricultural practices devised by the Mechanised Farming Corporation. They have in many cases cultivated even the animal tracks (width two kilometres) specified by the Corporation. [There is] continuous conflict between the owners of the large-scale mechanized schemes and the pastoralists... pastoral nomads are driven out of the best areas of their traditional pasture to places which are not favourable to their herd growth, and agro pastoralists are being subjected to various socio-economic pressures to abandon one of the two activities and change over to agricultural labourers with lower standards of living".

> "The tractor and the plough: The sociological dimension," in M. A. Mohamed Salih (ed.) Agrarian Change in the Central Rangelands: Sudan, A Socio-economic Analysis, Uppsala, Scandinavian Institute of African Studies, 1987

In Nuba Mountains, regardless of the clear short comings of mechanisation, the flux of mechanisation was continuing; indicators from various studies are cited below:

*(Nation wise): From a registered area of two million hectares in 1968, mechanised farms expanded to cover over eight million hectares in 1986.

* (Nuba Hills): Farms allocated by the MFC are known as demarcated, and those allocated by the local authorities are 'un-demarcated'. In 1993, large-scale mechanised farming covered 2.5 million feddans (of which 1 million were un-demarcated)

*The figure now for both un-demarcated and demarcated schemes is in the range of 3-4 million feddans – in other words between 9-12% of the surface of South Kordofan. These are all in the clay plains (21% of the area of South Kordofan), so around half of the area of the plains is taken up by schemes

The axioms of farm planning and control, what to produce, how to produce and how much to produce are violate. It is definite that the early interventions of mechanisation in Eastern Sudan have the objective of supplying British troops; later national expansions ignored the traditional producers ; the experience of micro irrigation along the Nile was not accompanied where private pump owner rent services to individuals.

As early as 1984, the World Bank review indicated the negative profitability effect of the traditional production on mechanisation; in good years the traditional production triples rendering mechanised

production unprofitable; However apologetically they admitted, some people have to produce for the urban sector.

In the (World Experience in Mechanisation), Ibnouf came with the conclusion that:

-In overall the studies failed to provide much evidence in yield increasing effect of tractorisation,

-On (timeliness), no conductive evidence was reached.

(Mohamed A Ibnouf, Mich. State University, 1991)

For both NMAC and MFC the thrust was on mechanization that created a negative effect on ground; project interventions were thought to relax the public stringencies without resolving the basic problem, in the last decade the CDF joined IFAD in this orientation together with other NGO's. The benefits of such orientation were clear in remunerating social services in war affected areas. What can be said with respect to the Nuba Mountains is that, projects in any format are selective in targeting. Reaching the peasant in a natural environment is a hot international dialogue over the last 30-40 years; in our case it is further exacerbated by super-imposing man-made set-up without accounting for who will benefit and who will lose.

RANGE IMPROVEMENT:

Two sites in Kordofan are cited; Al Odaya project and Gereigikh:

Al Odaya Rehabilitation Project:

Materially, the project is a new format for the Soil Conservation Committee recommendation (1944); based on fencing community grazing under FAO funding; previous proposals in the North Kordofan Land and Water use Survey recommended fencing of paddocks in the experimental stage, if proved successful, the southern fencing line would be the new northern line for further expansion. For Al Odaya barbed wire was introduced with a further suggestion of electrification of wire using solar energy.

As with other short run initiatives, there are benefits for the community within the project life time under an umbrella of a (Government) project; once funding terminated the project followed.

GIRAIGIKH COMMUNITY RANGE MANAGEMENT PROJECT is part of an international web experimentation and measurement related to global warming. The results obtained from the project are encouraging to invest in rehabilitation of the savannah belt to balance or absorb the carbon emission. With that in mind, the community benefit is a bi-product.

As with WSDC initiatives in community range management, it shows that communities are responsive in adopting management procedures; but in itself these measures are not sustainable in a context of a wide phenomenon.

THE SECOND PHASE OF DEVELOPMENT PROJECTS:

*The Gezira Enclave:

East of the White Nile, the conventional project format did not exist except for mechanised farming under the State's para-statals or Corporations at a later stage, the exception was the USAID project. This distinction is based on the existence of a corporate body at the site to implement a specific job. The USAID project continued its cycle with IFAD fund and thought useful to take the full scenario.

The basis for mechanisation were set with the Agadi State Farm in 1970 to pioneer large scale mechanisation in Southern Blue Nile region; the total area is 210000 feddans but currently the cumulative sum of leased mechanised projects, actual and on the pipeline exceeds the total area of the Blue Nile State.

Traditionally Sinnar and Blue Nile States host large cattle owning tribes notably Kenana and Rufaa as dry season grazing that extends to the northern reaches of the Southern region then. The wet season grazing extends toward Kosti. All these areas are now mechanised leaving little room for pastoralists. Currently a vent opened across the Roseiris dam to graze the Dindir area and it would not be without a cost to the environment or producers.

In general the traditional economy is undergoing major shifts:

-Increased settlement without a parallel plan for social services,

-structural changes in herd composition where Kenana tribe shifted to sheep raising, Rufaa following and the Fellata tribes are lagging.

-the hashab belt expanded to the south; and is becoming an important source of income.

- absentee land-lordism is a common feature in the area, in many cases the local population had to rent land

-the forestry department is a competitor on land.

The consequences of mechanisation on ground lead to the rise of many socio/economic and political problems. Whereas that was known for a length of time, no countermeasures were taken to rectify the situation.

All projects interventions from IFAD and others are dampers but not solutions.

*The Butana and Eastern Sudan:

Development initiatives in this area are quite limited; early developments in the Gash Delta, Tokar, Khashm Al Girba and mechanisation of Gedarif over shadowed the rest of the region. It is important to note that individual cultivators arrived at a formula to live with mechanisation and to a large extent nature opened a vent for animal husbandry to accommodate the adverse effects of mechanisation; crop failures do not deprive animals from grazing. At the southern limit the area was bounded by national reserve and Ar Rahad project. The insecurity situation lived in the eastern frontiers had attracted attention to this area specially that the Red Sea Hills is one of the most deprived areas in the Sudan. Interventions are equally difficult

*The Nile States: (see under –irrigation- p.37)

Since 1974 the international lending environment shifted emphasis from rural development approaches; throughout the period 1964-1985 major Donors have commitments to rural development projects in Darfur, in 1964 there was the FAO input in the North Kordofan Land Use project and USAID project in Southern Roseiris and an FAO input in Al Odaya.

In the interim period 1985-1989 IFAD shifted emphasis to strengthen irrigation project; the date of 1989 is a bench mark for the pull out of many international funding Agencies with the exception of IFAD as a donor, coordinator or catalyst in project input; many humanitarian AID NGO's shifted emphasis to development scenarios similar to that of IFAD.

Throughout the period ending in 1985, main Donors, the World Bank, IFAD, ODA have commitments in Darfur and Kordofan; the interventions in other regions were minimal with the exception of USAID in Southern Roseiris and FAO project of Al Odaya.

With respect to management operations, Donors preference varies; IFAD is a consortium leader, the World Bank works with NGO's and the British Government would likely go for SAHEL-Sudan or with IFAD. The approach to poverty related issues is likely to be the same.

DEVELOPMENT PROSPECTUS WITH IFAD, CDF AND NGO's

The mandate of IFAD as specified is bound working with existing institutions:

"IFAD will help farmers to meet global and local food needs. IFAD will support community designed and managed rural development projects and farmers organizations. IFAD will use Government and local management systems rather than managing projects itself. IFAD will be a catalyst to mobilize other Donors and Government resources and policies in favour of IFAD's target group" June 2011.

The Organisation was institutionalised in1977; the above should be read in conjunction with the community based and community empowerment approaches. Lessons learnt as such will focus on the institutional linkages.

Since the early 1990's there was a qualitative shift of emphasis in development thrust, as from the second half of 1980's, IFAD's programme was giving more emphasis to rain fed agriculture, specific issues were addressed:

-irrigation rehabilitation,

-drinking water supply,

-technology development and dissemination,

*The New Halfa irrigation Project had a long history of silt deposition in irrigation canals that affected negatively the whole population

In all these interventions it is likely that the operational criterion to sustain project input was not questioned. The IFAD own evaluation states:

Inadequate maintenance contributes to the poor performance of public schemes. The deterioration of the existing distribution systems and pumping equipment results in water shortages and thus in low yields and outputs. As a result, the rehabilitation effect has generally been short-lived.

*With that in mind the same operations and procedures were repeated in the Atbara River development interventions.

By 1992 a second collapse commenced and the Government sanctioned the creation of farmers companies to run these projects, the deterioration continued up to 1997 when they were saved by the Wheat indigenisation Project, eventually the Government laid hands on projects again.

*In the Nile States the Legal Framework of these projects is dubious; the operational document is an amended form of the water lease contract of the 1920's between the British administration/Companies and the cultivator.

* The responsibility to run the projects is divided between the Ministry of Irrigation, the Northern Corporation (under the National Corporation) and the Regional Ministry of Agriculture; the command line between the three is relatively long and less responsive.

*In the White Nile where projects are private, support services for spares and services are difficult, efficient and new models are likely to fall in that trap. For private schemes the worst outcome commences when a machine break down leading to crop failure and in turn credit repayment is in jeopardy.

*Projects boards whether nominated or elected are much similar to the villages committees. They lack the basic skill in running these projects; the situation on ground shows that they are a group of farmers measuring production in terms of pounds, four inches pipes and gallons suddenly found themselves faced with measurements in millions cubic meters and bowser load at a minimum.

In these matters the agricultural staff is no better, capitalising in administering the collection of water rates; the least statistical, mechanical and hydrological knowledge is severely lacking and the gap was filled by seconded staff as advisors at the Ministry's Head quarter. Projects boards are advisory in nature and are assigned the role of passing central directives via the site management manger.

*There is much to be learnt from these projects, for more detailed information the EVALUATION REPORT OF WHEAT INDIGENISATION is to be consulted.

2) SERVICES:

The range of services provided by IFAD and other Agencies in different project formats are likely to be exhaustive in consideration of the differences in environment and socio-economic circumstances. Needs of settled population vary from that of nomads or transhumant societies. In consideration of space and investment level; no project will be in a position to cause a (big Bang) that would politically attracts attention to what the project had done or raise a public demand.

The services scenario builds around the Blue Nile Rural Development Project, though not purely an IFAD project but had contributed to. The essence of the intervention is to accommodate traditional farmers into mechanised/traditional set up; the learning process entailed a shift to relaxing production constraints within an existing system to gradually build systems that ensure sustainability.

As a background for BNRDP; in the early 1970's the Rural Development Department launched a study of the Kurmuk Council which highlighted the poverty of services and population. The study suggested a mechanised scheme to improve the living standards of the population under an umbrella of a cooperative. This issue was picked presumably by USAID.

As with similar mechanisation projects, land demarcation and allocation followed the grid format and Cooperatives regulation; conceptually on an egalitarian bases; all of which contradict the rural production systems in two important issues:

Firstly, the basic production unit is part of the family life cycle; secondly individual land parcels are part of a land cycle; the interface of the two is dynamic. To illustrate, a household composed of a man and wife would clear land to cultivate and with time the holding increase as well as the number of the family until the first adolescent member will be given land to cultivate on his own, each year his holding increase and the father's share decrease until sons occupy the full holding leaving a small piece for the father to feel himself busy.

This rigid format had been avoided in WSDC settlements by allowance grouping the individual shares of family members in one parcel and leaving the internal tenure to the family members to allow for the settlement stability in the next 20 years.

The end evaluation of the project states:

"The other USAID undertaking, upstream from Ed Damazin, the town at Roseiris Dam, was the Blue Nile Integrated Rural Development Project. Envisioned as an experiment in research seeking "a viable systems approach to smallholder farms and livestock development which will be suitable for replication," this project provided extension and credit to 2,500 farmers, of whom 1,000 also received tractor services. It consumed approximately $15 million. In 1983, when $12 million had been committed, the project manager noted that the credit cooperatives were developing slowly, with acute repayment problems, and that the range-management division, charged with "organizing and modernizing pastoral activity," had "done little except to conduct a vaccination program."

Eventually USAID pulled out in 1989.

The residual of the project was picked by IFAD in 1992. For IFAD there are two in built conceptual errors, likely to be shared by Donors and possibly current stake holders at the national and regional level; land and land tenure; in IFAD's perception:

(Land is the means for survival and social reproduction, a source of individual and tribal ***pride****- a general relationship between social groups and also a constant source of potential exploitation and conflict)*

(Today, inadequate rural land tenure is identified as a key constraint to the development of more Productive land use and sustainable land use systems, and is an underlying cause of many environmental problems and a major obstacle to sustainable land use, as farmers have little incentive to ***invest*** *in and protect natural resources).*

Key words in the above text are bolded; for IFAD, land is disassociated from the individual and tribe; as thus, it is a factor of production and inter-alia the family is a maximiser.

The second notion is investment in land; the notion of protecting natural resources is a very recent addition to the theory.

These guiding principles revolve about the stringencies between arable cropping, animal husbandry and mechanisation; but no agency local or international can give an acceptable reasoning on why these problems are acute where ever mechanised farming was introduced. In other areas these problems are un-noted or dilute.
This misconception is behind the short comings of the project and similarly eroded initiatives of modernisation of the traditional rain fed farming in the Nuba Mountains.

The IFAD's own evaluation and lesson learning indicate the mismatch between the conceptions and farmers circumstances on ground, and there is much more between the lines; beneficiaries taking wrong decisions, private innovators management need more clarification, whether coming from a care taker or a progressive farmer. Credit will be discussed under credit:

(The project design assumed a) abundance of farm land and absence of constraints to access it and; b) automatic allocation of lands previously under BNIADP. Experience proved the contrary. In fact, this issue delayed project implementation for over three years. Moreover, experience clearly shows that land tenure arrangements are quite complicated and pregnant with multifarious problems which could constrain the progress of the project and its sustainability.

(Beneficiaries are likely to take decisions (e.g. in crop rotation and cropping patterns) which are technically incorrect as well as incompatible with project design, and that project management accepts and implements such incorrect decisions. This points clearly to the need for careful scrutiny of VCSs' decisions; particularly relating to technical matters, at the highest levels of management.)

(However, it should be clearly understood that such technically deleterious measures are taken by farmers (individually or collectively) to reduce short term losses within a context of a short term survival strategy. Such decisions which result in less than optimal utilisation of farm lands and ultimately total loss of fertility are associated with inefficient management. This could be a reflection of a combination of poor design and implementation and absence of corrective measures.)

(Project success in introducing Wad Ahmed sorghum variety and failure of Kenana-2 sesame are both useful lessons to learn in that farmers have to participate in the selection of varieties after thorough testing and demonstration by extension.)

*(The application of innovative private management principles by government-funded projects is likely to be resisted by the bureaucracy. It was indeed unrealistic to think that the bureaucracy would not challenge or even rule out the approach during the course of implementation.

*For devolution of authority to the beneficiaries, a lot more serious training and capacity-building of the cooperative structures, the AGCU and VCSs was necessary, and the project design should have earmarked adequate resources for this purpose.

*Guarantee funds in high risk rain-fed agriculture are essential for the commitment of participating banks and successful credit operation. In its absence, ABS opted for (a) very short term credit, instead of a period of up to 18 months as per design, and (b) very strict and coercive measures to ensure repayments.)

THE EXPERIENCE OF THE BLUE NILE PROJECT echoes the modernisation of the traditional rain fed farming of the Nuba Mountains. Interventions in Sinnar are in part ameliorating the hazardous situation of the nomadic community who for various reasons settled; the Project area covers the localities of Dindir, Abu Hujar and Dali & Mazmoum in Sinnar State, covering 100 villages distributed over the three localities; within these, the lowest strata of the population will be targeted:

The Blue Nile Project shall have three main components, as follows.
(a) Technology Transfer Component, which shall address productivity constraints for crops and livestock; participating households (are to) adopt minimum tillage, soil and water conservation and livestock nutrition packages. Contracts with private machinery operators will be a key instrument to deliver timely land preparation services to producers groups.
(b) Market Access and Post-Harvest Management Component, which shall
tackle issues related to physical market accessibility and post-harvest handling
techniques; the main activity shall be the construction of crossings
and training communities on maintaining them.

(c) Capacity Building and Institution Strengthening Component, which shall support the establishment of appropriate arrangements for building the capacity of producers to adopt environment-friendly production techniques; promulgation of laws favouring sustainable use of land and water resources, and the establishment of an efficient project management set-up.

These components are in built in most of development projects, yet the final outcome is either poor or moderate; these initiatives are to assist the poor people to cope with a situation more than looking at the root causes of poverty. Within the project life time these interventions are secured and benefit is visible so long as this subsidised assistance is continued.

It comes to the question of the entity of poverty. The 1984 famine indicated that food security and poverty are not a linear equation but rather a curve; in food as an example there is the number of meals on one axis and the amount consumed on the other, where they cross is the point of satisfaction and beyond it is affluence. Where do beneficiaries stand along these curves is an important question which up to now no organisation dared to investigate.

3)CREDIT

AN NAHUD CREDIT PROJECT: is a modality in credit provision as one of the early initiatives to introduce the community collateral. It is a piece of luck that the designer of the concept as an ABS staff was in charge of the credit project. The experience of WSDC of deferred payments, joint WSDC and local council responsibility, liaison with ABS and fund administration through extension set- up was invoked, capitalising on community norms. The format was behind the success of AnNahud project, but once that chain link was broken by project completion the credit programme collapsed. There are clear benefit streams within the project life time.

In IFAD's internal evaluation this dynamism was not considered:

(While *participation cannot alone ensure the sustainability of development efforts, it does reduce the risks involved and create conditions which are favourable to it. These benefits could have been more evident had project designers and managers been more open to people's participation)*

The key element in IFAD's perception is community participation. The problem is on the operational mechanism. Why rural money lenders do not go bankrupted is a question.

The theoretical background with credit is expanding the production edge through borrowing; which means acquisition of a minimum limit of own resources, with lending the borrower's gains from credit are detached from his spending. Credit in almost all projects is a vehicle for obtaining other agricultural inputs, whether farmers are persuaded or feel a genuine demand for these input is critical; seeds, farm implements and similar extension packages are blue prints across all projects; the reality of peoples participation under these circumstances would be fictitious especially when customary institutions were not invoked, credit is a free resource. The experience of restocking, fertilisers and seeds indicate that these inputs are partially converted to liquid money for other purposes.

This is quite important for working with existing institutions. A blanket format in credit should be avoided; tailoring credit to effective demand and giving some thought to disposal system are pre-requisites. Evaluation of SCF (UK) seed programme showed that there is a difference in approaching a community with (this is intended for the poor) and approaching committees with (give it to the poor); in the first all consider themselves poor including the village merchant, and in the second community norms will be enacted to isolate the top better off layer.

4)TECHNOLOGY

a)Mechanization

It is established that the traditional rain fed farming, given the present level of technology, cannot do better. This was supported by the findings of agronomic adaptive research during the period 1972-1980. The open vent lies in the domain of intermediate technology and other machinery where possible, to be supported by institution building.

In Darfur long term project initiatives, built on farmers innovation, prototypes of tool bars, ox ploughs and weeders were tested and finally settled on a shrink of the ox plough; WSDC opted for training local blacksmiths to manufacture the donkey plough; the Jebel Marra RD and Modernization of The traditional Rain Fed Sector (the Project) opted for contracting manufacturers to fabricate the Jebel Marra Plough and the Nuba Plough. From within these strategies the donkey plough had better chance for up take.

The Idd Elfirsan ADS opted for import with no much success as the composite plough was too heavy. In the Nuba Mountains NGO's imported a multi-tine plough in limited quantities though moderately heavy, beneficiaries are satisfied, but constraints are seen to be in two aspects, the supply is limited and prospects of local manufacturing are difficult.
The drift towards tractorisation can hardly be set as successful; this applies to the Nuba Mountains as well as Southern Blue Nile; in Gedarif however farmers managed to live with which points to the importance of the socio/economic infrastructure of dominance in the area of concern; additionally the experience of Gedarif indicates an adaptation process and not a revolution.

b) IMPROVED SEEDS

*1) under condition of environmental uncertainty, it is important to consider the question of land races. Where alternatives can be found; farmers are to be convinced through a practical approach that the new seeds are appropriate and adapted,

The perception of farmers as risk averts is not true, the opportunity cost of failure of adopted innovations like seeds can result in material damage extending over years.

* There is a qualitative shift from the standard seed provision format in seed development project which is targeting (i) in North Kordofan, Rahad and Sheikan; (ii) in South Kordofan, Abbassiya and Abu Gubeiha.

Extracts from the document are stated below:

1)The project approach is characterized by: (i) the promotion of a public-private partnership model for the supply and production of seeds between the private sector, community organizations and extension teams; (ii) the introduction of cost recovery for services such as extension, production of registered seeds, inspection and certification; and (iii) a phased strategy that allows testing of the production and marketing model and adjustment to changes in the regulatory environment. The project will be implemented over six years in three phases: (i) a pre-effectiveness phase from October 2011 to the declaration of grant effectiveness expected in February 2012; (ii) a calibration phase during the period 2012-2014; and (iii) an intensification/scaling-up phase during the period 2015-2017)

2)The project has three types of beneficiaries: (i) 1,280 seed growers; (ii) 108,000 smallholder producers using certified seeds and improved soil and water conservation techniques on one million feddans (iii) one or two seed companies contributing to the establishment of seed supply and marketing.
Revenues will be highest for two types of grain producer: (i) grain producers in South Kordofan using certified seeds on sandy soils (ii) grain producers using certified seeds under supplementary irrigation
For the seed companies the net profit margin averages 8 per cent over the project period. The economic internal rate of return for the project was calculated at 26 per cent.

3)The sustainability of the project rests on two factors: (i) an enabling institutional framework, established thanks to the enforcement of the Seed Act 2010, the ratification and enforcement of the plant variety protection legislation and the increased capacity of the NSA to inspect and certify seeds; and (ii) at full development, all project services, such as NSA inspection and certification of seeds, production of registered seeds by the ARC and the advisory services of extension teams, will be provided on a fee basis.

For the approach and sustainability the highlighted/underlined text are the critical points:
As an approach it should be credited for an NGO to look for basic solutions to the seed quality problem; but does not state the starting point; what seed quality to be propagated. It seems likely that the lessons learning of humanitarian aid in seed provision are not accompanied; the difference here is the institutionalisation of what aid agencies did in a slice in time.
SCF(UK) as an example launched a technical consultancy on what seed to bring in; the advice is to go for (Dimbi) cultivar of millet; the next step is a contractual arrangement with seed companies conditional on NCA endorsement and certification; the third step is distribution.
The evaluation report of 1994 showed that there are a minimum of five zones each growing a relatively different cultivar of Dimbi.
In a hazardous environment, farmers innovation is governed by thee axioms; a) allow seeds to migrate within the belt and across belts, b) keep experimenting with other cultivars and c) keep the land race.
This explains why across Darfur and the sandy areas of Kordofan every three to five years a new cultivar; secondly the re-appearance of land races which were thought to be consumed during the famine of 1984.

The question of sustainability depends on a committed institution to cater for a continuous injection of seed supply across seed belts that are clearly marked on maps. In both Kordofan and Darfur research results over twenty years were lost once this service stopped due to the high segregation rate of millet and sorghum and on equal footing the ground nuts. The conclusion arrived at by IFAD, cited below strengthen what came above:

(There is no conclusive evidence that IFAD's attempts at promoting adaptive research have yielded any specific dividends, due to the following factors:

- the lack of a comprehensive analysis of farmers' needs and constraints led to the formulation of research and extension programmes that were too ambitious;

- the project designs did not adequately match programmes to the resources available and did not take fully into account the difficult living and operating conditions in the areas;

- Inability to supply effective, long-term leadership; and
- component design was sometimes loose in that it left the design of the programme to implementing agencies)

This end evaluation contradicts the general orientation of the seed programme; seed release requires about three years to be confirmed while the programme initial phase was two years; with ARC it would be useful if the whereabouts of Sodiri, P9, Yarawasha and others are known on ground. Research and certified seed injection in arid lands is an institution of its own account.

The novel issue which IFAD raised is the networking which is vital for the Ministry of Agriculture to de-rust its performance in the rain fed agriculture; if a courageous step could be taken by the Minister or the Wali of the respective region. The Regional offices of the Ministry of Agricultural should embark on adaptive research leaving basic research to ARC:

(The project will contribute to knowledge management in the following ways:
(i) networking in the Near East and North Africa region and the Programmes Management Department on techniques related to soil and water conservation and livestock nutrition and their uptake by smallholders; (ii) in-country networking through annual implementation workshops, donor coordination meetings, seminars and workshops; (iii) regional knowledge networking, especially

through the knowledge Access in Rural Inter-connected Areas Network (KariaNet); and (iv) regional research networks such as the International Center for Agricultural Research in the Dry Areas (ICARDA), the Arab Authority for Agricultural Investment and Development (AAAID) and the Arab Organization for Agricultural Development (AOAD), in addition to the existing partnership with the World Bank, the World Food Programme (WFP), the Food and Agriculture Organization of the United Nations (FAO) and the United Nations Development Programme (UNDP).)

5)INISTITUTIONAL SUPPORT AND BUILDING:

Perhaps the single most important late orientation of IFAD is land tenure; if the basic concepts of land use, and not taking the interlocking system patterns of production, arable cropping, animal husbandry and the settled/nomadic continuum; the outcome is likely to be disastrous.
Throughout the last thirty years, all the pitfalls of current laws and regulations were known with certainty, no attempts for revision were taken simply because with each law an institution was created and it is becoming a vested interest to guard the status quo; that in many respects resembles the International Community sanctions, easy to pass and difficult to lift.
The statement states:

(*In order to influence a shift in land-use patterns, the COSOP proposes a rationale for land tenure to be discussed with the government and donor partners. This consists in the vesting of formal land titles through community-based organisations which might be able to offer the title as collateral for development financing. The COSOP suggests encouraging State government to offer land under reasonable lease conditions. Finally, the COSOP also takes into account transhumant land needs of pastoralists through demarcation of grazing land and stock-routes and leasing of grazing rights. Although the COSOP does not explicitly refer to innovation, the model of local governance of natural resources applied in the GSLRP is one of the major innovations of the IFAD Country programme.*)

In IFAD's terms:

. *Project sustainability, which has been identified as a key weakness since The Sudan Country Portfolio Evaluation of 1994, requires broader efforts beyond the simple scope of project activities. The Evaluation found hard-earned gains in projects are threatened with loss when projects come to an end and there are no prospects for follow-up with internally generated resources. The solution that consists in phasing out the external (IFAD) contribution during the period of implementation often proved unrealistic, because it takes much more time (in the range of 15-20 years) to reach results that are sustainable. Hence, an important aspect of sustainability is continuity of support to avoid the degeneration and possible loss of good results and assets. At the same time, situation of donor dependency should be avoided.*

Regardless of the bold statement which focuses on land tenure as (the) solution, the second part brings forth the issue of sustainability indicating that the dry land issue is more complicated; the interface between dry land issues and conventional economic thought is likely to be cultural. On (Dry lands research,(research implications and policy dialogue); in the London Workshop, 2001:

(The main findings of the four studies were presented and reviewed at an international workshop in London in 2001, arranged by the Overseas Development Institute with Dry lands Research and the Economic and Social Research Council of the UK, in the series 'Transformations in African agriculture'. After the presentation of the results, the policy lessons and implications were reviewed by four working groups which considered the following questions:
(1) is a v iew of rural livelihood transformation as driven by capacities as well as by constraints a practicable basis for policy formation?
(2) What areas are critically important in constructing an enabling policy framework for livelihood development in the dry-lands?
(3) Recognizing that politicians are influenced by interest groups, how can a participatory debate on enabling policy formation be initiated and sustained at the national level?)

The disparity between the solid recommendation of incorporating land policy in national policy and the raised question indicate the complexity of Arid Lands puzzle; techno/academics acknowledge the difficulty while Economists of major donors insist on enforcing their own ideology with regards to land, or the hard line approach.

LAND POLICY SYNERGIES:

The model outlines the behavioural patterns of rural livelihood and linkages to land policy issues; boxes are domains, and arrows depict the flow; the model describes the state in the sandy areas but the ecosystem format and production parameters are common to the rural areas.

Universally, where feudal system does not exist, or anarchies where land belong to the King, land is a public concern; it is either kept on behalf of the community or community ethics rested on private ownership. In both land and related issues are spelled in constitutions.

(1)In (Arid lands) rain fall is the controlling factor; which, on nature is quite variable; with that the productivity of any soil type cannot be guaranteed to know with certainty the use mode.

*On nature differences in the parent rock and soil formation mechanism resulted in geomorphic units with different moisture retention characteristics, or ecotypes; each with a different capacity. Historically livelihood was adjusted to these circumstances and through time a coping and regulatory mechanism was devised; governance takes into consideration the system capacity and balance. How to live with these responsive systems is a management domain and not administration; guiding land use planning and its connotations in the absence of alternatives to the current users is not realistic; registration violates responsiveness; land use can be mapped but not fixed.

*Within an ecotype there are identifiable variations with known boundaries to the local inhabitants; within these sub units there is a long term village rotation, as can be marked with the density of the planted shade trees (neem mostly or balanites); around the current village site there are the conventional family holding in which cropping and a short term rotation is practiced. Villages rotate and land rotate, both in relation to the internal system balance.

*Defining land in this context would naturally raise the issues of environment management and sustainability. Land per-se is not a factor of production and maximisation takes place subject to a missing vector.

(2) With the enactment of the UN-Registered Land Act (URLA) all the land was deemed Government property; and The Peoples Local Government Act abolished the tribal administration which used to perform the regulatory functions on behalf of the community and substituted with Para-government committees. Matched with that is the mis-interpretation of the constitutional citizen rights for a multitude of purposes. The effect was drastic:

*The scramble for the local political support through hosting new comers came as a cost to the long term village rotation and on the land buffer kept for the future; at the end traditional honorary land sheikhs were de-moralised; the limits of the cultivation plot were open; hashab was felled to allow more land for crop production, especially when gum prices were low. The situation with land was becoming increasingly land mining as the opportunity to locate new places is open. Between 1974 and 1995 Darfur reserve of virgin lands including the tribal buffer zones was consumed except for places where water halted the progression

*In this concern land laws in urban area catered for a regulatory mechanism; in rural areas that was left open for the wisdom of the administrator, who are generally less sensitive to the environmental

issues. Local councils are partners prioritising in quick revenue generation through collection of crop tax, water yard revenue and land lease for mechanisation.

(3)Technically, production in arid lands is time bound where the growing season barely exceeds 120 days, starting from sowing to the maturity of crop.

*The most critical period is the establishment of crop, sowing and the first weeding decides the future food security of the next year.

*Maximizing the labour returns to this window is critical, implying that any health hazard or shortages of food or cash supply to buy food will negatively affect production and productivity. For health hazards it is important to have a health facility providing medicine at least for malaria and chest diseases.

*Whereas this window is two to three weeks long; there are number of strategies; in seeding late maturing varieties were dry sown or at the earliest rain shower approximately exceeding five millimetres, seed source as a priority is secured from own production. Within villages there are buffers of quick maturing cultivars if rain started late.

*On land the maximum area would be sown and inwardly concentrate if rain fall continued. Within this limit the production possibility frontier is constrained, the open alternative to expand it is through employing intermediate technology or hiring labour.

*On seeds it is important to consider land races or equivalents that have the capacity to withstand water stress, good seeds for one area may not be by necessity fit for other.

* With intermediate technology there is the question of appropriateness and supply, if the right implement was found production can increase two to three folds. Hiring labour is likely to depend on the financial resources.

(4)The family welfare depends on manipulating more than one source; gum picking where resource endowment allows is one vent; as mentioned earlier the unregulated population movement and gum pricing expanded the crop land and shortened the fallow, both have adverse effect on the hashab business. The relationship of arable cropping and regeneration of Hashab on family holding is known given that the fallow period is no less than 15 years which in the last decades is unlikely; the well to do gradually developed an acquired right over the distant sparse hashab which by now is a government domain.

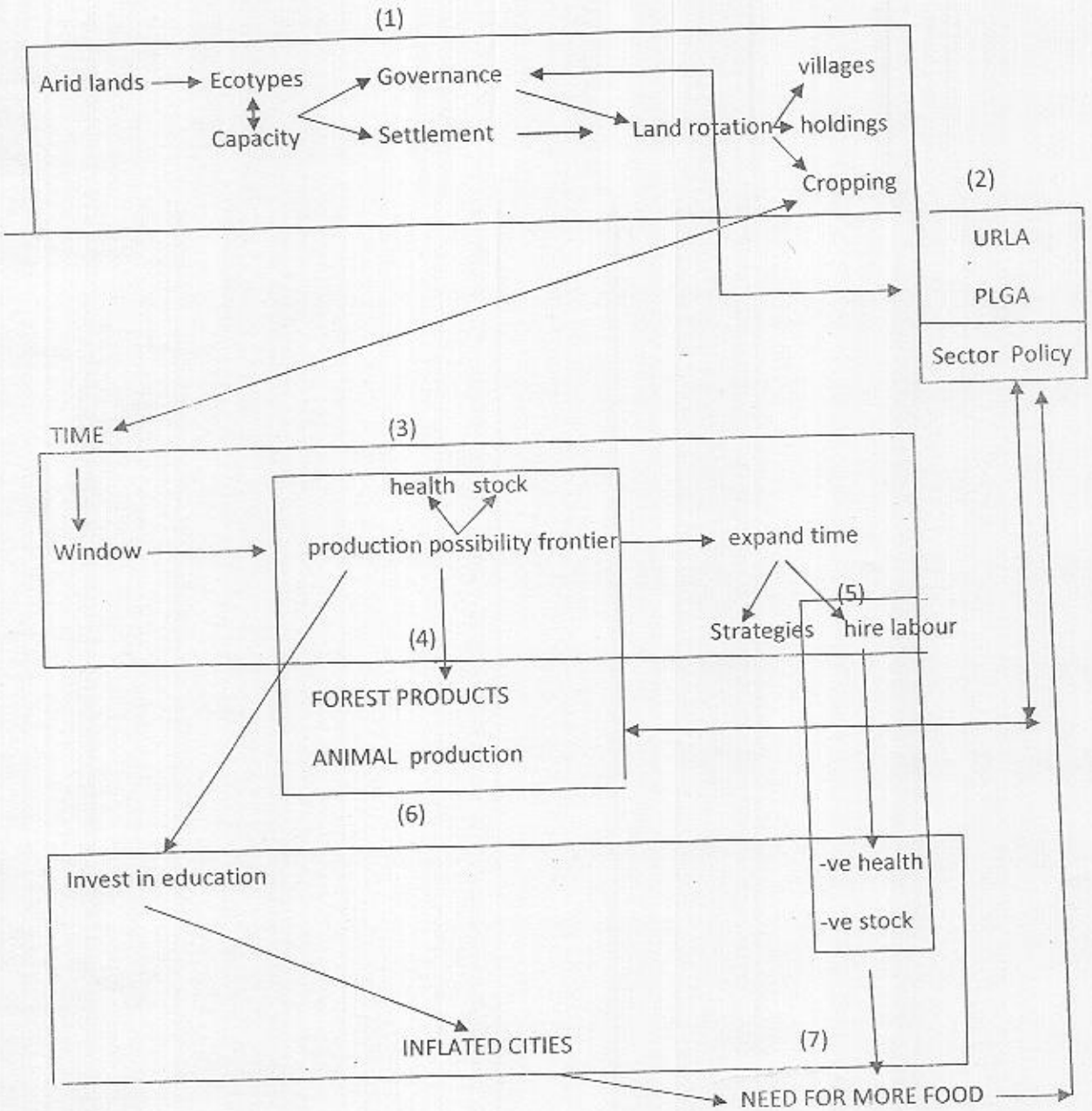
*The second vent is in animal production which like hashab was affected by over use of land at the local level; heavier herds were negatively affected by the expansion of the mechanised cultivation. The un regulated settlement in tribal buffer zones had further exacerbated blocking the stock routes in the rainy season grazing areas. The current drive to demarcate stock routes is not realistic as stock routes are a web of interlinked nodes

(5)The worst that may face a producer is to be in a position to hire himself, as that will negatively affect his production and productivity and prone for health hazards, the labour demand is seasonal which forces him to join migrants to the cities and finally settle in towns.

(6)For some time investment in educating children was common among rural population. This in essence means a long association with the particular location for a minimum of ten years. The repercussions of that on land are evident in the form of a sub-optimal fallow period; leading to the appearance of the degraded circles around service centres. Boarding houses which used to allow some room for moving villages in the long term rotation are abolished; parents now are to stick to where the children are to be served in the hope of future benefits.

With the current tightening of the paid job opportunities, education now is a social requirement; the cost to the society is in increasing urban dwellers.

Throughout this scenario, mechanised farming was getting momentum to feed cities, meanwhile circumstances in the rural areas triggers the loop back for more mechanisation and imports at the expense of the rural welfare.



PART THREE

MAPPING ARID LANDS

INTRODUCTION:

Mapping arid lands in the Sudan would be discussed as an inseparable part of lessons learning, perceived as constituting the image on ground for the theme in question. Mapping can be approached from two ends; either to be required to delineate particular attributes which normally academics do in global context; and the second is purposively survey land to scrutinize boundaries of specific characteristics.

It is to be stressed that mapping is not value free. .Any development initiative or theme on nature, would have a minimum set of pre-conceived attributes that are in effect on ground; if necessary, would be projected on maps as a proxy of the land surface, in match with the specific objective of the mapping initiative. In application, the policy magnitude is quite clear since mapping entails quantification, costs and benefits, and inter-alia, policy and politics dimensions.

Past experience in the Sudan demonstrates the complexity of the issue and relevance to the issue in hand; addressing the question of (Arid Lands); the case of (land-use map and the land-use law); the two cannot be taken in isolation.

In 1948 the Soil Conservation Committee Report raised the issue of land use; the compilation of the familiar Jackson and Harrison map, the text of Professor Lebon on land use in the Sudan and others high-lighted issues necessitating drafting a land use law; once that was set, the respective departments, Soil Conservation, Range and Pasture, Forestry Department and Wild Life came to a head-on collision on who shall administer the jurisdictions of the law since it's very beginning.

This was further complicated by changes in rule structure from the Local Government to Peoples Local Government whereas in the Local Government Act all the departments are technical bodies headed by an inspector and the overall coordinator is the Rural Council executive officer, the shift of the People's Local Government Act placed technical departments, financially under the Local Government Act with support from the centre and technically under the central ministries, and hence the nomenclature was changed to manager. The effect is that the team work concept was lost and the subsequent changes and amendments of acts failed to restore the old order. Subsequently, this was further complicated by the enactment of the Regional Rule Act in which we have (Governments) and not (Departments).

Similarly, additional confusion that impinge on the comprehensiveness of issues of dry lands is the multitude of stake-holders, and what theme to be followed, whether land use, desertification,

environment, investment, governance plus others of diverse origin and orientation; the resultant effect is a loss of focus. As an illustration the term (environment) did not settle to a contender, foresters, range specialists, (ecologists as a grasp all frame), natural resources authorities, the ministry of environment and the high council of environment each perceiving himself as (THE) authority; in a session of the Institute of Environment, the representative of a senior authority stated that the law of environment is the collective sum of laws of the respective departments.

The confusion residual is demonstrated in curtailing three important comprehensive works of relevance to dry lands; the Livestock Aerial Census of Watson and Tippet 1976, which in addition to biomass densities, covered almost all aspects of land use and resource base, the second is the Technical Assistance in drought Preparedness and Desertification by HTS in 1994 which is of value for arid lands and the third is the AFRI-COVER; the link departments respectively were the Animal Resources, Soil Conservation and the Forestry Corporation; the three were shelved and information dissemination of the three was minimal. At present, inter-departmental acquiring information is increasingly becoming difficult.

It is legitimate to assume that the present input centres on how these odds can be coordinated, or, focused. Maps in general reflect the guiding principles according to which maps are drafted.

IN SEARCH FOR AN OBJECTIVE:

In investigating the causality of mapping arid lands, there would be a host of interlocking magnitudes including, and not restricted to, an objective, location, distribution, quantification, trends and policy implications.

As early as 1958, the issue was discussed in the Proceedings of the 9'Th Pacific Science Congress from which the following is quoted; in itself may be a guiding principle:

"The characteristics of land surface, and it's suitability for supporting mankind, vary in an infinite number of ways, and the need for some kind of areal subdivisions and categorization to enable problems of land use planning and economic assessment to be approached systematically is evident enough not to require emphasis.

Many kinds of subdivisions are used either for specific purposes or in relation to a specific characteristic. Thus, there are produced distribution maps for such characteristics as physiography, climate, vegetation, forestry, pastures, soils, water resources, present land use, land capabilities and a host of other features which serves to subdivide territory according to the classes adopted for the characteristic.

In some instances the specific feature mapped in the dominant characteristic influencing land use potential, but its importance may not be the same in different parts of that territory. In many instances it may be of little significance by itself, and only of value if considered in conjunction with other features. Thus the correlation between the mapped classes of one characteristic and land use patterns in a region may be high, low or variable depending upon its range of variability and that of other characteristics and also to no small degree upon the method of classification which had been used for the particular feature.

Any approach to the subdivisions of the territory into similar and dis-similar areas on the basis of like or unlike combinations of characteristics such as can be shown by the use of overlay maps or by other means could lead to a degree of complexity which would be very difficult to put to practical use. It would also be subject to any inadequacy of the methods of classification used for the individual characteristic.

.....while the many methods of subdivision of territory used may have significance on a continental basis or at the other extreme in very small areas where intensive correlative work has already been done, they are usually of limited value when applied to the order of variation of an intermediate nature, such as with geographic regions- the sort of circumstances which the land use planner is frequently concerned"

The underlined text above, high lights the importance of the purpose of mapping which should normally materialize in a learning exercise or planning and economic assessment; and more, an embedded policy magnitude.

THE FRAME-WORK BASE:

For biomass habitat in general rests on natural parameters, climate and soil. The resultant interaction between the biomass and nature is an input output relation projected in the use mode pattern. Whether this interaction is balanced or not, is a critical question for human livelihood; especially when comparative studies or observations indicate that not all the areas are equal in resource endowment, which brought forward the problem of measurement.

Many of these parameters are projected in maps; some of which commends more in-depth research and fine tuning. This is particularly important when referring to distribution patterns which take the form of cross country scope, soil, rainfall, geology, drainage are examples. Almost all of them are indicative but do not comprehend a theme of action without further detailing. Within this context certain areas crop up for more attention is required; and hence, comes the term (arid Lands).

Historic geographers for ease of reference used to divide the ancient world into regions. Currently this concept is used but against a set climatic criteria that divided the world into climatic zones. Within that there are many methodologies the simplest is:

$0 \leq P \leq 200$ mm for arid

$0 \leq P \leq 400$ mm for semi arid

(P) = annual precipitation (see, mapping/references)

These annual indices when grouped on regional bases to comprehend the salient characteristics of the regions we come to classification such as arid, semi-arid etc; in that alternatives are, effective rainfall to adjusting precipitation data (annual in mm) by evaporative loss, itself reflected in temperature (mean annual temperature in C) to produce climax index:

-Kuppen classification where (BW) was designated for arid lands;

The disadvantages of Kuppen classification were amended by Thornwaite in 1948 by introducing the concept of evapotranspiration, and distinguishing between the actual evapotranspiration (AEP) and potential evapotranspiration (PEP). Others include:

-Lang index I= P/T:

Arid I≤ 5

Semi arid 5≤I≤35

Sub-humid I≥ 35

- Angstron index I= P/1.07^T

At present the Penman formula was widely used as a tool for classification and analysis of various systems.

At a lower level, the conventional mean annual rain fall of the Sudan is an example

DEFINING ARID LANDs:

The definition given by the world Resource institute (WRI) of dry lands and aridity states the following:

"*Aridity can be defined in different ways. The most direct definitions use climatic parameters, either as a single rainfall figure or as a combination of figures into an aridity index... Aridity can, however, also be expressed by other features like vegetation, land characteristics or soil capability, using indirect diagnostic criterion for describing and delimiting arid lands*" (Mapping/references)

At the Global level, mapping through any of the criteria results in zones across the Globe or adapted at the continental scale, this in turn was subject to super-imposition of national boundaries which highlights the sub units. Policy wise at this level it may be considered passive or academic

At our National level, the current terminology of (Arid Lands) and (Dry Lands) had a base in the UN Convention to Combat Desertification (CCD). In 1979 the UNESCO introduced a world-wide smean potential evapotranspiration. The world is divided to six aridity zones; dry lands include hyper arid, arid, semi-arid and dry sub-humid:

Hyper arid P/PET ≤0.03

Arid areas 0.03≤P/PET≤0.02 rain fall 80-150 mm (winter); 200-300 mm (summer)

Semi-arid 0.2≤P/PET≤0.5 rain fall 300-400 mm (winter); 700-800 mm (summer)

Currently, for the UN agencies this is the standard for dry lands classification.

The Sudan is part of the arid lands, that, dry lands in the Sudan are estimated to be 1.676 million squared kilometres out of a total area of 2.508 million squared kilometres; with the partition of the South it is evident that the country as a whole is dry land.

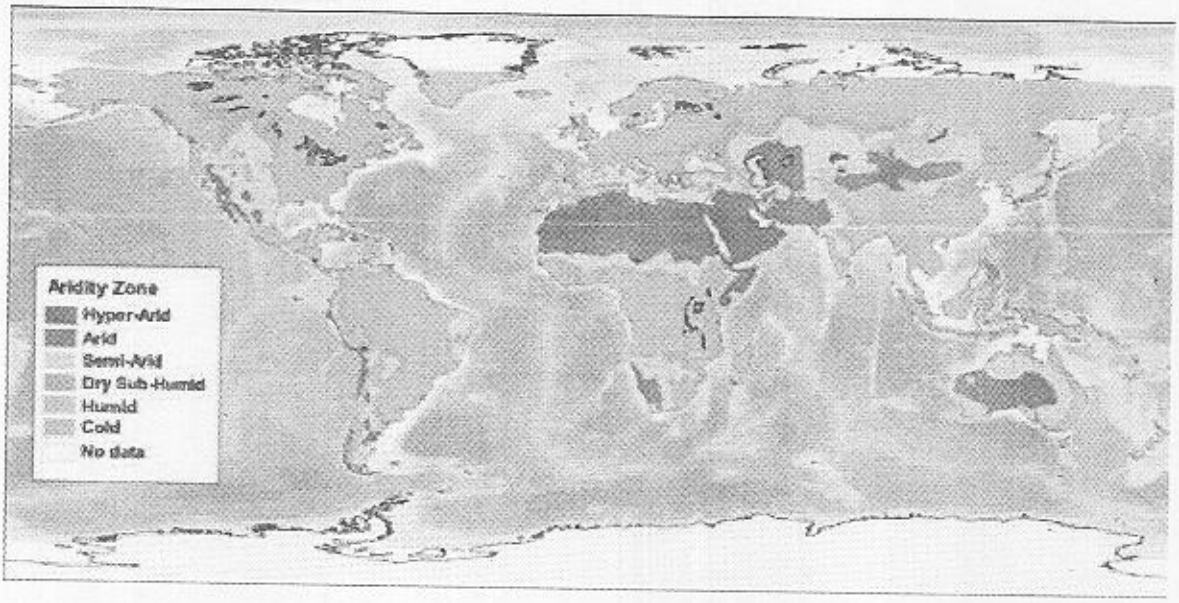
In Wikipedia the term –dry lands- is elaborated as:

"Dry lands are areas of Land with low amount of water in the soil. These include arid lands, where the evapotranspiration exceeds the rate of precipitation, and semi-arid lands where precipitation is low enough that water acts as a major limiting factor in plant growth.

Dry lands occupy 50% of global land area. Dry lands are complex, evolving structures whose characteristics and dynamic properties depend on many inter-related links between climate, soil and vegetation"

Map ( ) shows the extent of dry lands in the world:

Map 1. Aridity Zones of the World



THE OPERATIONAL FRAMES:

Mapping can be broadly categorized into three; this is mainly with respect to broader indicators that distinguish it from the special purpose detailed maps of urban areas and the farm level mapping; these are:

- Cross country or continental zones, showing mostly a single factor, among which are distribution maps and patterns, more sophisticated techniques would result in indicative indices which are likely to high-light policy parameters.
- Ecosystems; these are frames marking the boundaries of certain criteria, further detailed by quantification of the criteria in hand. The convention rests on bio-diversity.
- Land systems; mostly linked to application of, or quantification of specific variable. The land system approach is mostly applied by land use-planners; hence the physical magnitude is important.

(1)THE ZONE CONCEPT:

Within the context of global zones, various phenomena are displayed, themes were mapped to include soils, vegetation, rain fall, land use and various bio-mass distribution maps and in atlases commonly found in international organizations web-sites. Increasingly, web based data is used.

The focal points of the United Nations agencies for Arica in general and the Sudan in particular, is part of the global responsibility of the United Nations, food, poverty, environment, etc.

The concept of (zone) is universally picked by practitioners in Ecology, agriculture, metrology and other disciplines; the more known nomenclature is ecological, agro-ecological, and agro-climatic. It should not be confused with the concept of System as in (cropping systems)

It is to be remembered that when the favourable conditions of the 1950's elapsed, the proceedings of the 1960's drought had triggered a motion from the UN that the savannah belt of Africa would no longer support the inhabitants of the region; the Sudan had been chosen to pilot in combating desertification as basic information was available, (maps of Jackson and Harrison grazing Survey, soil reconnaissance maps etc.). The interplay of natural factors to produce different patterns; the serviceability of this interplay rests on quantification of the phenomena of interest.

The globalization of the phenomena materialized in the Convention to Combat Desertification, these frames were to circumscribe GIS information to produce numerical indicators such as the work of Taylor & Francis:

The objective of this study was to find the best-performing aridity index and time-frame in the Iberian Peninsula characterizing the effect of dryness on agricultural production. To achieve this goal time-series of 5 aridity indices for 1998 October–2009 December time-period were calculated on a 25 × 25 km grid, and the closest relationship with plant biomass was determined. Plant biomass was represented by the SPOT-VEGETATION Normalized Difference Vegetation Index (NDVI) satellite data masked out for rain-fed arable land for the period between 1998 and 2009, and also by official yield statistics of Spain and Portugal between 1999 and 2009. Aridity indices calculated for time frames matching the entire vegetative period resulted in the highest correlation coefficients with NDVI and with the crop yield. There was a difference between the two time frames covering twelve months. In contrast with the calendar year, using the hydrological year (1 October–30 September) ensured a very strong correlation between NDVI data and most aridity indices, with UNEP and Water Deficit aridity indices outperforming the others. Among the shorter time frames of April-October, January–October, and October–June, the latter provided very strong correlation between vegetation, UNEP and Water Deficit indices surpassing Budyko, De Martonne, and Thornthwaite aridity indices

Here there is a reference to (NDVI) which was used for producing AFRI-COVER ATLAS, which is recently updated to fit into the Sudan's Regional context and software is provided to update, manipulate or overlay new information on the base maps.

(2)THE ECO-SYSTEM CONCEPT:

The term is used to describe a characteristic distribution and attributes on ground, but the usage ranges from the habitat of an organism to discrete geographical habitats area wise or larger across the whole globe:

The Concept of Ecosystem as described by Walt Whitman

An ecosystem consists of the biological community that occurs in some locale, and the physical and chemical factors that make up its non-living or abiotic environment. There are many examples of ecosystems -- a pond, a forest, an estuary, grassland. The boundaries are not fixed in any objective way, although sometimes they seem obvious, as with the shoreline of a small pond. Usually the boundaries of an ecosystem are chosen for practical reasons having to do with the goals of the particular study.

The study of ecosystems mainly consists of the study of certain processes that link the living, or biotic, components to the non-living, or abiotic, components. ***Energy transformations*** *and* ***biogeochemical cycling*** *are the main processes that comprise the field of ecosystem ecology. As we learned earlier, ecology generally is defined as the interactions of organisms with one another and with the environment in which they occur. We can study ecology at the level of the individual, the population, the community, and the ecosystem.*

An important concept; (eco-system functioning) is coming to the fore ground, for some, it is not important to concentrate at the particulars, soils, rainfall vegetation etc, but these subunits designated as eco systems are realities on their own account and what matters is that all components work in harmony at a pivotal point or, system balance. The outcome would normally be the capability of the ecosystem to (produce goods and services) to reflect the internal dynamics of these zones, measuring the current level and the trend. Goods and services are quantification of resource endowment and usage subject to the criteria in question.

One important tool is the NDVI described in the WRI document as "*a remote sensing tool used to track global vegetation cover. It is derived from Advanced Very High Resolution Radiometer (AVHRR) data and related to the proportion of photosynthetic absorbed radiation*". The drawback of NDVI is that "while *it provides values for total vegetation, it cannot distinguish species combination*".

Among the alternative methods that are suggested is the use of Net Primary Productivity (NPP):

"NPP is the total vegetative production of an eco-system minus losses due to respiration. As the amount of organic carbon that plants actually make available to other organisms in an ecosystem, NPP may be a more direct indicator of actual yield of vegetation than the NDVI, which is the measure of light absorption. Direct observation on NPP are not available globally, but computer models derived from local observation and NDVI have been developed to represent global NPP.

A second method is the Rain Use Efficiency:

Rain Use Efficiency is the ratio of NPP to rainfall. It normalizes vegetative production to rainfall and may be of benefit in revealing trends in land degradation.

Farming system is closely related as an ecological based terminology. The convention came to use after the (Green Revolution) in recognition that major break -through in research findings were difficult to replicate as in the case of rice or wheat, research should focus on specific crop geographically identified domains. Examples here are Goz Lands farming System, Millet farming system etc, that, combines biological research, environmental and economic parameters.

The term may be broadened to satisfy a pre-stated objective. The United Nations Definition for a farming system is that:

A farming system is defined as a population of individual farm systems that have broadly similar resource bases, enterprise patterns, household livelihoods and constraints, and for which similar development strategies and interventions would be appropriate. Depending on the scale of the analysis, a farming system can encompass a few dozen or many millions of households.

The classification of the farming systems of developing regions has been based on the following criteria:

- *available natural resource base, including water, land, grazing areas and forest; climate, of which altitude is one important determinant; landscape, including slope; farm size, tenure and organization; and*

- *dominant pattern of farm activities and household livelihoods, including field crops, livestock, trees, aquaculture, hunting and gathering, processing and off-farm activities; and taking into account the main technologies used, which determine the intensity of production and integration of crops, livestock and other activities*

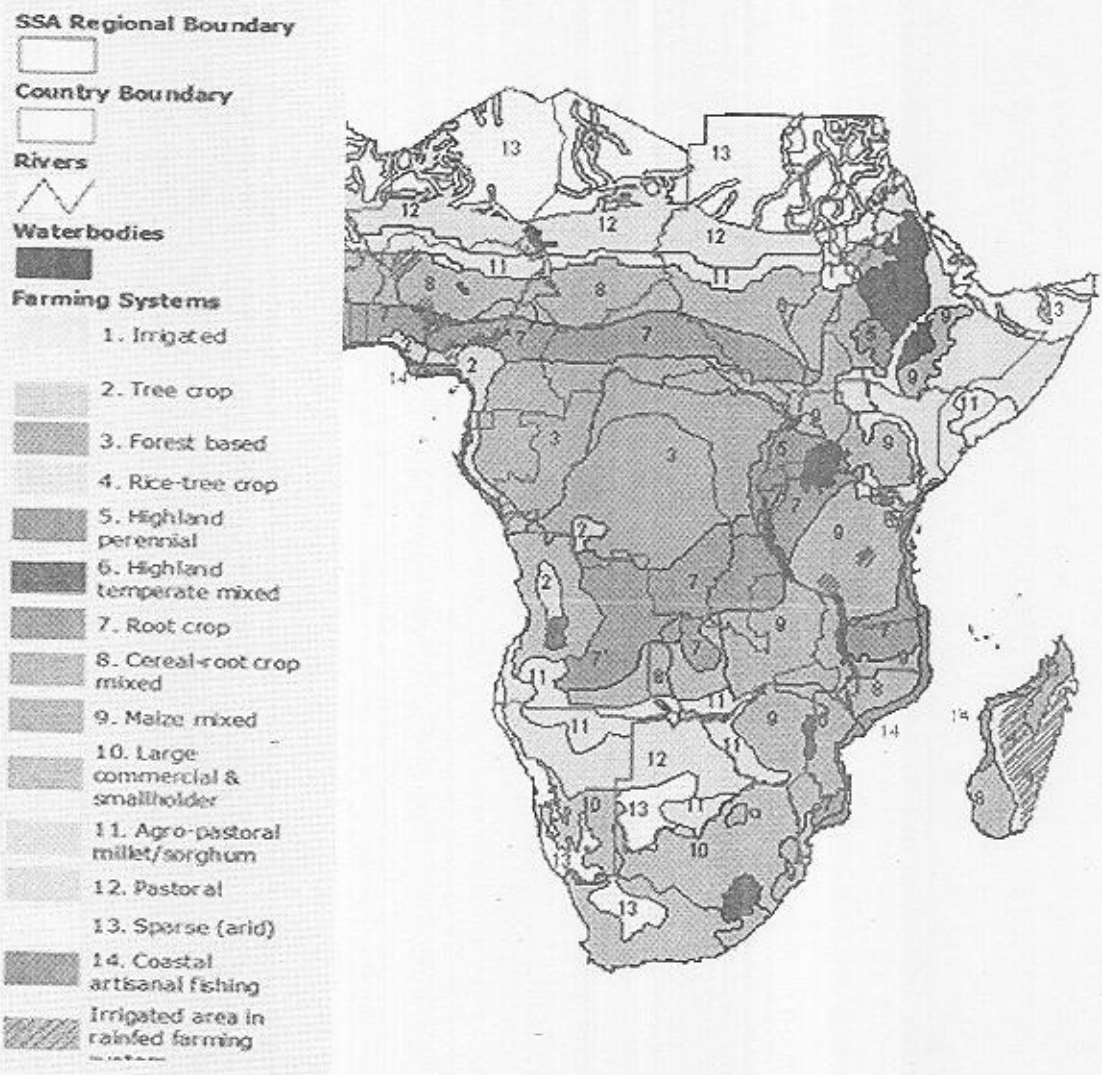
Reservation against the eco-system, were echoed, that

Forging stronger linkages between geomorphology and ecosystem ecology depends, in part, upon developing common conceptualizations of an ecosystem. Because most ecosystem processes are scale dependent, the choice of boundaries is of profound importance to the conceptualization of an ecosystem and to the scope and validity of questions being asked within that ecosystem. Indeed, any conceptualization of an ecosystem requires constraining the spatial and temporal scales of analysis. Thus, it is of particular importance to match the ecosystem boundaries to the question being asked or to the processes being studied and, to facilitate better communication among disciplines, to be explicit in the definitions adopted for an ecosystem.

Defining an ecosystem can be problematic when the processes of interest operate at potentially different scales, and little research exists comparing scales of geomorphic processes with those of ecological processes. Here we will discuss the importance of scale in geomorphic and ecological research, and compare and contrast disciplinary biases and inclinations. To highlight the problem of conflicting spatial scales, we will draw on recent attempts to link the structure of food webs to measures of ecosystem size. In particular, problems arise where little or no strong association exists among community membership, resource supply, and physical boundaries. Similar problems arise

when trying to link geomorphologic and ecological processes that can operate at different, but variable, temporal scales.

Major Farming Systems: Sub-Saharan Africa:



(3)- THE LAND SYSTEM CONCEPT:

Mapping is in effect describes the current situation; and further inference may be drawn for future policy. In recognition of the importance of land use, the definition given by FAO *in Land Use Systems (LUS) mapping*

** - Land use is considered the major driving force of land degradation LUS mapping analyses natural resources, land cover and socio-economic data using a combination of simple spatial modelling and expert knowledge. The LUS-map units also include other sets of biophysical and socio-economic information of relevance to land resources and ecosystems degradation that provide a cartographic basis for national assessments.*

From the land use point of view the objective criteria goes beyond raising issues, for they are already preset, the concept of land, land units and land systems was developed in Australia as early as 1946:

"*where such parts of land surface can be identified as having a similar genesis and can be described similarly in terms of the major inherent features of consequence to land use, namely, topography, soil, vegetation and climate they are regarded as being members of the same land unit*"

In recent times the GIS information is a valuable addition to the methodology; the land unit is the basal structure, where *the land system is an assembly of land units which are geographically and genetically related, defined as*:

"a region throughout which a recurring pattern of topography, soil and vegetation can be recognized"....."a change in the pattern determines the boundary of land system"

"a simple land system is a group of closely related topographic units, usually small in number, that have arisen as a product of a common geomorphologic phenomenon. The topographic units thus constitute a geographically associated series and are directly and consequentially related to one another"

With the exception of Professor Lebon's work which was academic in nature, projects that adopted the concept used the convention as a vehicle to support their strategy for land-use development

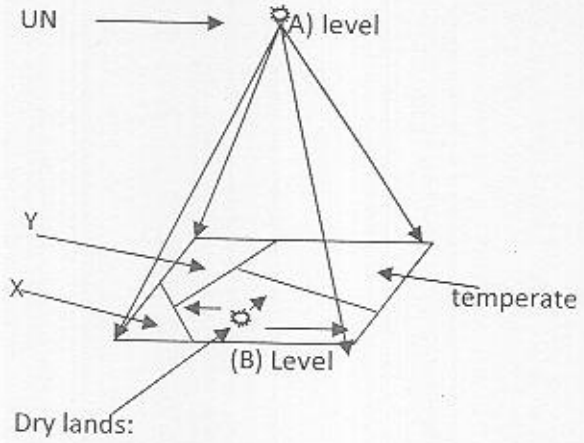
ASSIGNUNG A MAGNITUDE TO (ARID LANDS):

All the above mentioned mapping principles have found some sort of application in the Sudan, but never-the-less the coverage was restricted to the special agency requirement. The most comprehensive are the national distribution maps; this is in terms of the set criteria of mapping; comprehensive should be understood as having a national coverage.

From the range of methodologies, some can be working frames that can guide policy outlines. Use of GIS can enhance the perception of the characteristic of interest; channels were available but some home-work is required.

The term for the Sudan is exogenous on equal footing with other development jargons which need to be adapted to the Sudan situation without losing the communication link with the patronage authorities. The mandate of the UN agencies is global, at the extreme, global warming, desertification, environment and with that dry lands and land commission etc.; which generally point to the fact that there is a problem. The situation can be represented in the following illustration:

Point (A) represents the UN perspective, which has to be global over all zones; hence it is concerned with raising issues more than direct solutions, it can sell or promote methodologies to address specific problems to the particular frame's stakeholders; here the Sudan will be in point (B), designated as dry lands in the hope that the Sudan will respond positively to the issues raised. It is of importance to note that the Sudan used to be a figure in this respect, but it is noticeable that the situation is sliding back and the lead now is for West Africa and the Horn of Africa with respect to land policy



The terminology of (arid lands) need to be fine tuned or adapted to the circumstances of the Sudan; Technically it can be apprehended, but policy wise it may be a flat term for politicians and administrators simply because they live in it as a fact of life. The thrust on land related issues is changing (see in; methodology/land use concept)

Among the important reasons for the dilute image of arid lands is being lived for many as a fact of life. At present the hot issues are food policy, poverty and land policy; these signals received from International Organizations were perceived in differently by different stake holders, each interpreting against his own mandate or time horizon. At present there is more than one agency in charge of Arid Lands, Environment and the Land related issues to include the Land Commission.

The UNDP message states that:(*The degradation more often than not takes place at an alarming rate as a result of a complex interplay of natural factors (e.g. climate variability and change) and human-induced factors (e.g. unsustainable land use driven by geographic pressure and insecure land tenure system). Furthermore, lack of alternative livelihood opportunities triggers conflicts over control of and access to scarce resources.)*

All of these traits are in need of quantification; the derivation to conclusions should be relaxed until solid figures and projections were arrived at.

MAP WORK REVIEW

For an objective evaluation, the cartographic material produced by Government agencies and NGOs to include Aid projects and projections will be addressed in categories reflecting the design criteria, strength and weaknesses would be discussed, and cross references to the which institution, location, characteristics, attributes and most important coverage.

Map coverage in particular extends from a council, area, regional and to the National level. As will be seen there is no uniformity in methodology, or format within one Region or at the National level, more or less a user's theme in line with the investment or academic model which makes it difficult to follow on historical bases.

ZONE FRAMES:

This refers to inter-regional coverage either embracing the National boundaries or slicing a specific zone within the country describing a specific attribute, climate, vegetation, geology, soils and gum belt. Two types can be identified, thematic (i.e. general) and indicative; the difference is that the latter is purposive to guide an action, mainly investment

(1) Climate:

Rain fall distribution maps:

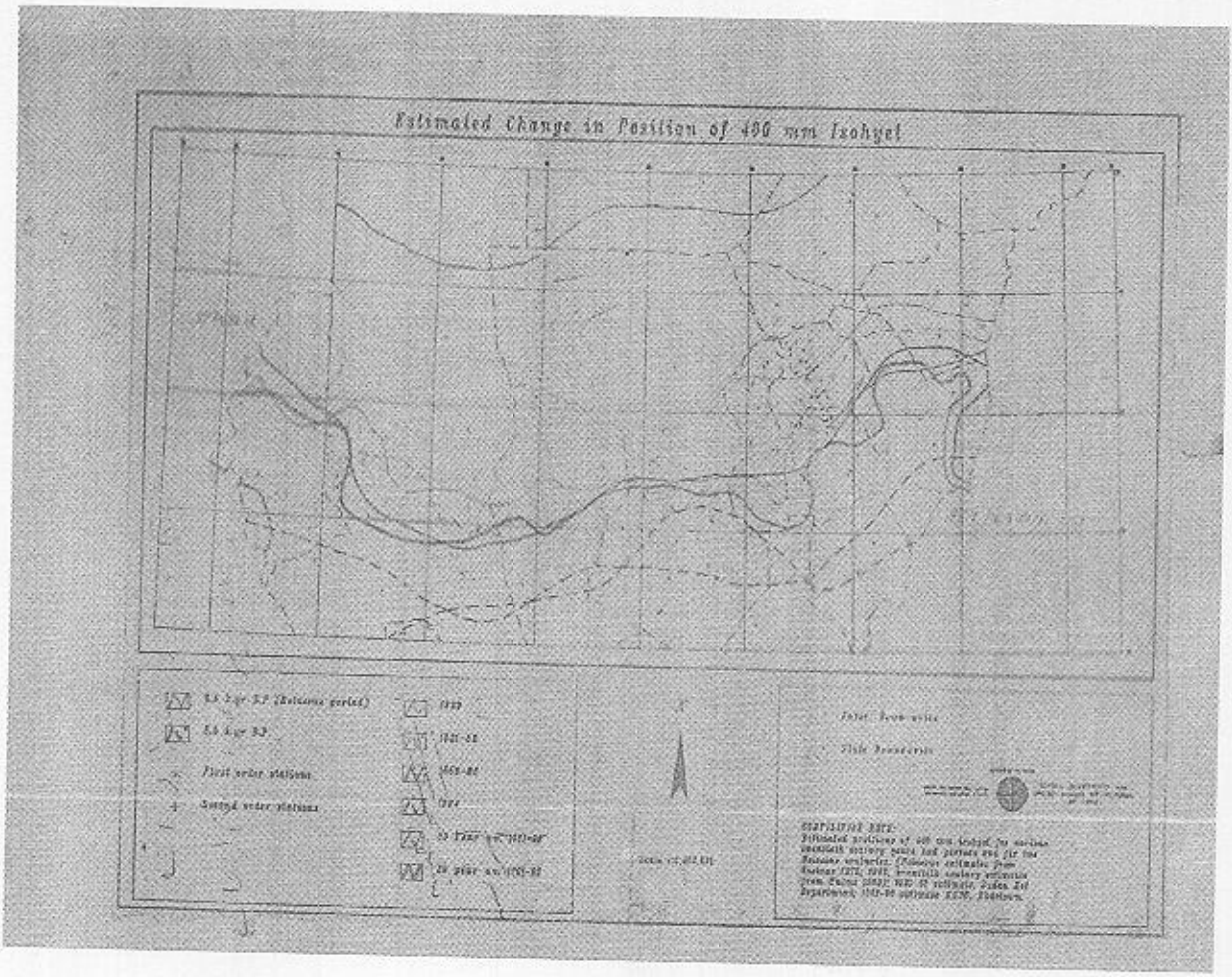
A) Theme mapping:

These maps reflect mean annual rainfall distribution as inferred from rain-gauge data for the set period; ten years average or might be thirty years. Over time these maps were updated to reflect the current situation. The compilation note of the map should indicate the time frame, within which isohyets are shown.

Rainfall maps are static simply because it rests on a (mean annual) that does not reflect the annual variation in rain fall, and hence, not stable. This is illustrated in HTS compiled map which shows the variability of the 400 mm isohyets.

On ground, rain-fed cultivators general rule is to have one good year out of three, and in drier areas it is one in five, though not in line of statistical procedures but portrays a public probability consensus. This issue was picked in Southern Darfur Land-use Planning Survey (1972-1974 HTS) to compile probability map for the Project area for selected locations to indicate the probability of having 400 mm annual rainfall

(HTS, the variability of 400 mm)


Estimated Change in Position of 406 mm Isohyet

There are alternatives for the mean annual rainfall but rarely referred to; the (effective rainy days) defined as rainy days of five mm. of rainfall and over, and their long term mean; for El-Fashir as an example, it is clear that a series of three years down spiral indicates a food gap or a famine.

In localized research projects the standard deviation would be plotted to indicate the variability on ground, which sounds more as an academic exercise, but effective in terms of research policy that should be followed.

In general the annual rainfall means are accepted frames for global themes, desertification and arid lands, either demarcated against the set criteria of Kuppen, Thornwaite or UNESCO, or alternatively global maps are geo-referenced to the Sudan boundaries; any of the two marks the arid zone of the Sudan.

B) Indicative mapping:

1) The most important set of maps is that produced by the Arab Organization in the early 1970's as the (CLIMATE OF THE ARAB WORLD). The contribution was published in an Atlas in which the various climatic attributes were shown diagrammatically or mapped. For the Sudan, maps showed Southern Blue Nile as the most secured in terms of rain fall incidence. Accordingly most of the Arab investment in Mechanized Agriculture went to that Area.

Technically the methodology adopted by Arab climatologists reflects a super technical expertise that relied heavily on probability and statistical methods; in certain aspects it requires an above average knowledge to interpret. However the whole exercise was not repeated or updated, and internally did not find much attention, possibly because of the large volume of the document and atlas.

2) Mapping of wind velocity:

This work was executed in the 1940's **. The overall objective was to see the technical feasibility of using wind force to pump drinking clean water in the Gezira scheme and else -where in the Sudan; the survey indicated that wind speed in the Gezira is enough to generate sufficient power to drive the wind mills, and secondly Central Sudan enjoys the most turbulent air currents relative to other areas in the country.

The design criteria if needed is in fluids physics; however the end result is pumps were installed, to have in mind that the pumping capacity is limited.

(2) SOILS:

In soil science there is more than one criterion for classification; what is set to be the standard will be projected in maps. This is not limited to the Sudan, but working criteria was continuously being revised; now, technically, there is a uniformity in methodology but may be abridged to the comprehension of users of limited soil science base; instead

of finding vertisols, luvisols, etc. frequently class one, two or three are used. The question of boundaries is always a problem in equal footing with the other mapping techniques since soil groups merge into each other. This should be noted when overlaying was used. This is illustrated Dr. Bernard et.al (2005)

"Given that unlike most subjects of other natural sciences, soils on the landscape are not discrete and well-defined entities, but a continuum, their identification and classification after more than 100 years of soil science has remained a contentious issue. This resulted in the development of many rival/parallel classification systems in many countries in both Europe and the Americas. Recently, in 1998 the International Union of Soil Science (IUSS) proposed a new soil correlation system: the World Reference Base for Soil Resources (WRB) which was officially endorsed by all soil scientists, which may solve this particular age old problem. In the main time in the tropics, especially Africa.....Three main soil classification systems are currently in use: the US Soil Taxonomy, FAO-UNESCO Soil Legend (now the WRB) and the French CPCS systems. Thus, a good understanding of these three systems is necessary for the correlation of the large amount of documented work in those systems for proper technology transfer in the tropics..... As a way forward, since a large amount of the analytical data produced in most laboratories in the developing countries have low reliability threshold for exploitation, it proposes some methods to cross-check analyticai data quality before use, as this is centrai to any meaningful work on soil inventory."

As early as 1928, a preliminary soil map for the Sudan was drafted; generic, highlighting the salient features as the central clay plains and the extent of the Goz etc. Currently the shift for an alternative classification materialized in other frames.

Through time more field research was conducted which fine-tuned the earlier versions. At this level, National and Regional frames are at best reconnaissance maps. For practice, the characteristics of soil types were known, and soil boundaries can be projected on regional frames for further detailing.

The use of aerial photography in the Sudan for soil classification was early in the Sudan; but a complete cover did not allow systematic use; the latest phase for partial aerial survey commenced in the 1970's to update the 1:250000 ordinance maps along the Nile strip north of Khartoum; agricultural projects sites had been earlier studied by HTS/Sir McDonalds.

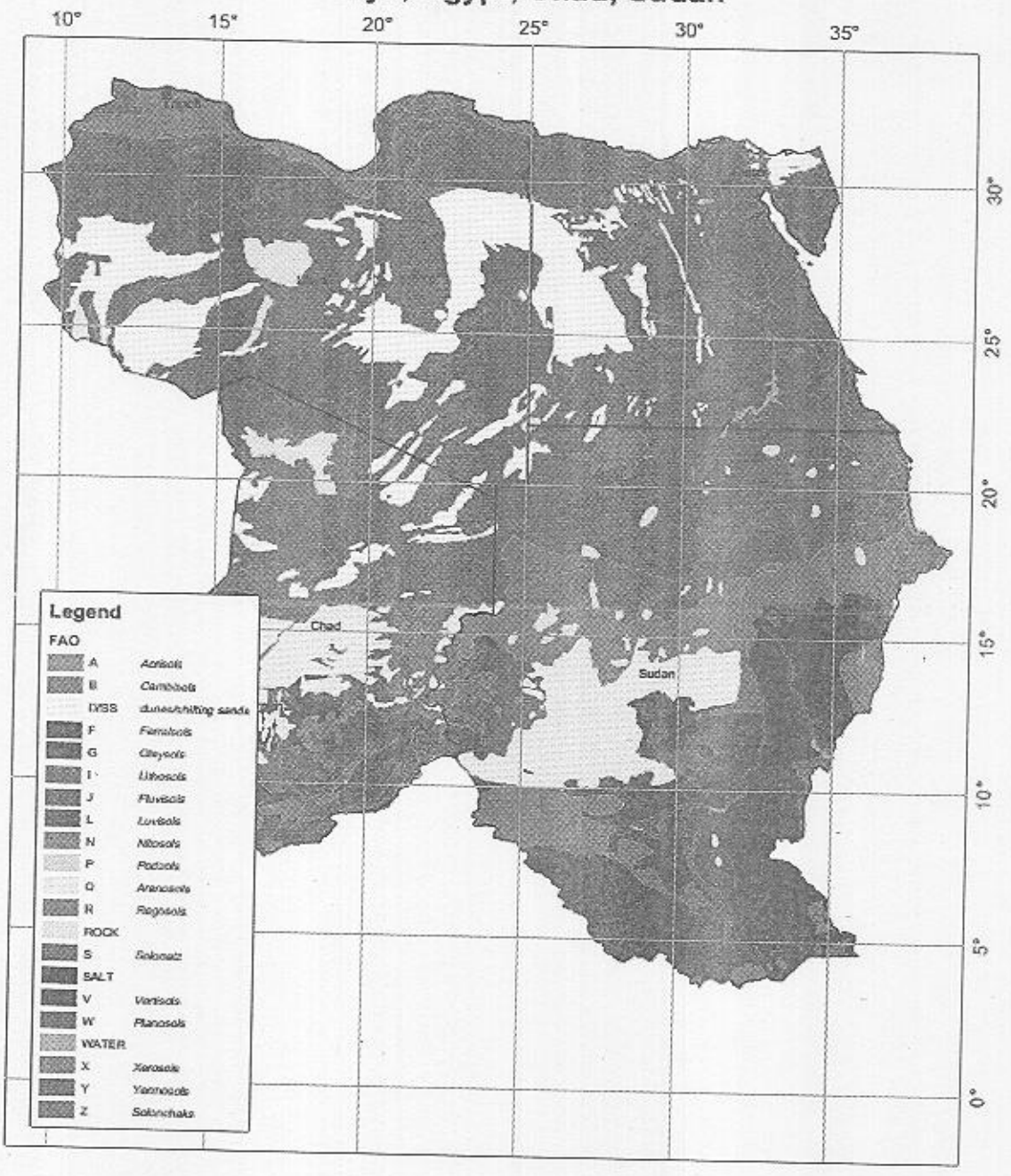
With the aid of aerial photography, soil classification in the early1970's was a break- through in time saving for soil science, demonstration trial run of application of GIS in classification of soil in Kordofan, was published by the work of Hashim and Pachico in Kordofan (Major). The contribution of ISRIC formed a foundation base; to note that isolation of discrete parcels of land do not vary from other methodologies, especially land systems as both are focusing on the same geomorphologic phenomena, parent rock and soil transportation mechanism.

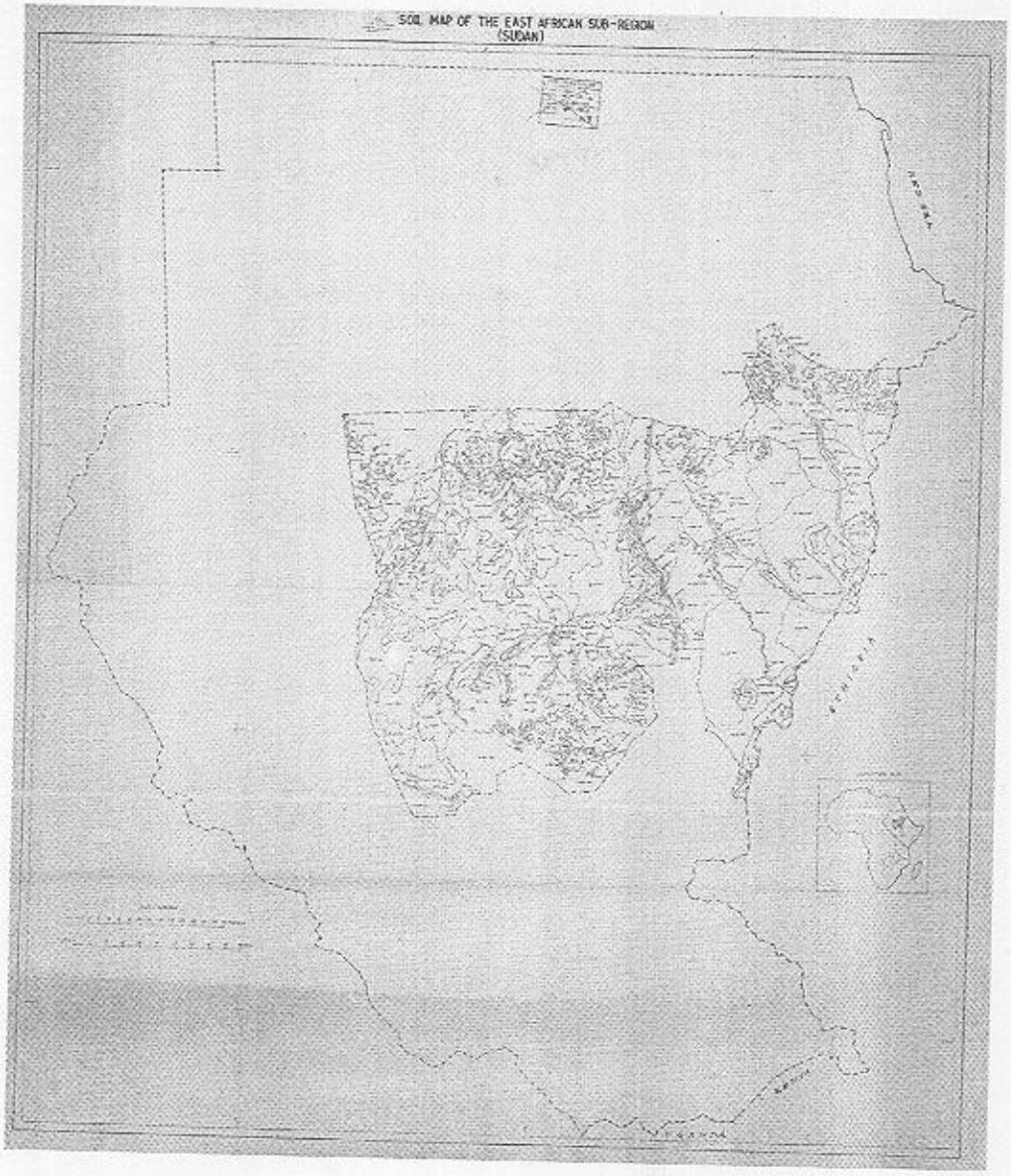
In the same period Netherlands contribution came as a semi detailed soil survey for the Nuba Hills and the Eastern Region possibly (page 22) in conjunction with the expansion of the mechanized farming. Since then one result was certain that sub- units of soils followed a geomorphologic bases. Surveys of Hunting Technical Services adopted a land system concept in South Darfur and in the

Nuba Hills in the late 1970's; followed by the Australian AACM which adopted a geomorphology frame; the difference is not necessarily in the boundaries but in the suffix they used.

An important note is that almost all national or regional maps can be categorized as reconnaissance maps which are indicative. In the soil science literature attributes of the various soil types were studied and at times in detail; so it is not enough to see the map but a companion of appropriate text should be present.

Soilclasses (FAO)
Libya, Egypt, Chad, Sudan



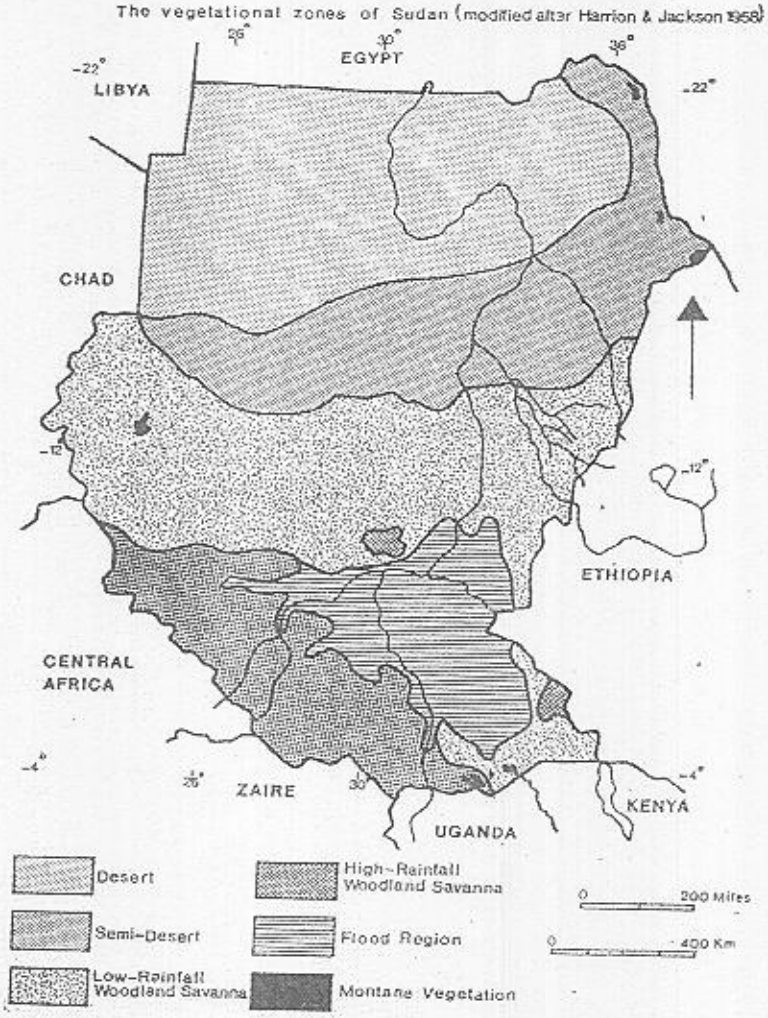


(3) VEGETATION:

Vegetation in its natural habitat is an interaction between climate and soil parameters; and inter-alia, reflects the potential for livelihood for both human and livestock population

In the mid 1950's two surveys were conducted, on forest resource and range resource. The two experts, Jackson and Harrison, independently, were found to have similar zone frames; and the two inputs were amalgamated in what is known as the Jackson and Harrison map; the (VEGETATION OF THE SUDAN); which remained for long time a standard, together with the companion text; (Fauna and Flora of the Sudan).

The vegetational zones of Sudan (modified after Harrion & Jackson 1958)



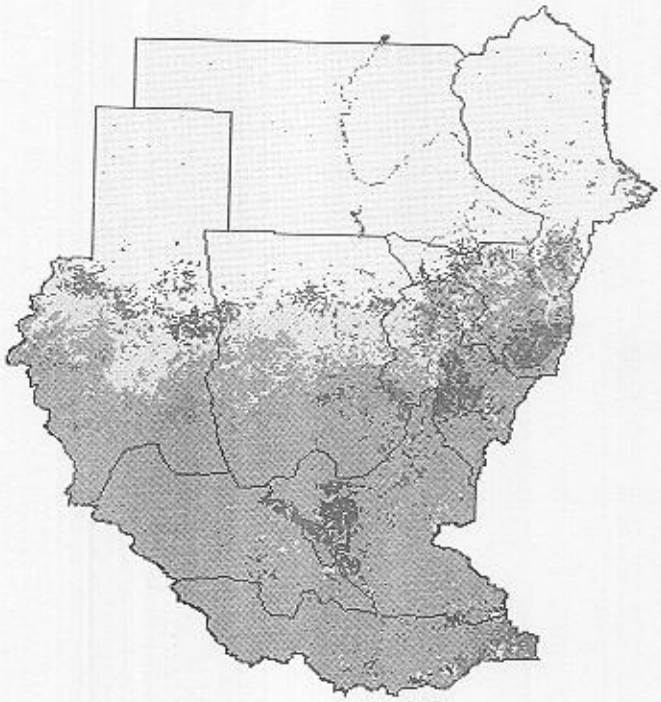
The methodology adopted is mainly transects lines; the dominant species were recorded. The problem of quantification, (densities and nutritional values); of the resource were left open; the

Range Management Authorities embarked on a series of (enclosures) where readings were supposed to be taken annually. Ultimately there seems no plan to generalize the findings of this exercise zone wise and became part of the routine. The lead in this effort was for the Rizaigat Pilot Ranch, which is now known as Gazala Gawazat.

The Soil Conservation Department with assistance from FAO experimented with rotational grazing in two sites; (Greih Elsarha and Al-gilaya alhimaira) and (Alkhamsat-Umrakuba); for socio-political reasons the first was restricted to Greih Elsarha where records were taken for a period of about ten years but were hardly analyzed mainly because of the limited technical know-how. Work on the other project was halted until finally converted to a resettlement scheme for WSDC.

In the mid-1970's HTS managed to map the vegetation of Ed-Dain district within the context of the Savanna Development Project, the output was projected in histograms showing the frequencies of the various vegetation types. The main difference with the other methodologies is the adoption of transit lines within envelopes around water-yards as sampling frames.

With the progression of drought, alterations in plant composition and distribution were noted in studies in the Nuba Hills and by the drought Sahelian input on range resource), rendering the map as obsolete, or outdated. The substitute came as the AFRI_COVER, with the Forestry Corporation as the link organization. The input material rests on GIS- which is time bound-; updating and adjustment to the Regional requirements was considered. A collaborative input under the United Nations guidance resulted in re-producing a digital Sudan Land Cover Atlas, and embodying suitable software for editing and truithing as required- National and State wise.



Comparing the three methodologies and the mapping output; the Jackson and Harrison map projects cross-country zone layers extending from north to south; the identifier are the dominant tree species, the ground cover is described in the accompanying text. There is no quantification of plan densities or palatability. Subsequent activities of Range and Pasture Authorities left this gap open except for the practical experience of individuals; and an exceptional interest in taxonomy of the plants. In the mid-1970's a subjective carrying capacity map was produced but it did not reflect more than the author's perception. The objective of establishing Gazala Gawazat for ranching exploration in the Rizaigat district did not materialize. For the Soil Conservation Department's pilot project; two short falls were clear, the statistical technical know-how and expansion plan were both lacking.

The methodology used by HTS in the (Savannah Development Project Phase II) projected the frequencies of vegetation and the sort of existing land use; in the Nuba Hills it proved to be unrepeatable; especially when the land surface is hilly or rough. The Southern Darfur Land Use Planning Survey 1972-1974 established a series of enclosures in the land systems of the area; monitoring and paddock cuts were regular; but there was no conclusive result for the overall fodder situation; however a graph of the nutritional value of ten selected species was arrived at.

The Afri-Cover incorporates coding not only of vegetation, but extends to cropped and waste land; the indices were projected in histograms showing vegetated parts, cropped, mechanized, urban lands etc.

In mapping grazing lands, there are many problems embedded, firstly the differentiation between species; secondly there is the inherent problem of defining the grazing land where it was taken that any land which was not cultivated is considered as a grazing land. Additionally, there is no consideration for the all important fallow land; in any rain fed cultivation, the actually cropped land represents one third of land needed for sustaining traditional rain fed farming; there are great disparities in estimating forest areas and grazing areas. The problem of quantification will be dealt with in the commentary on the Sahelian Range Land Potential.

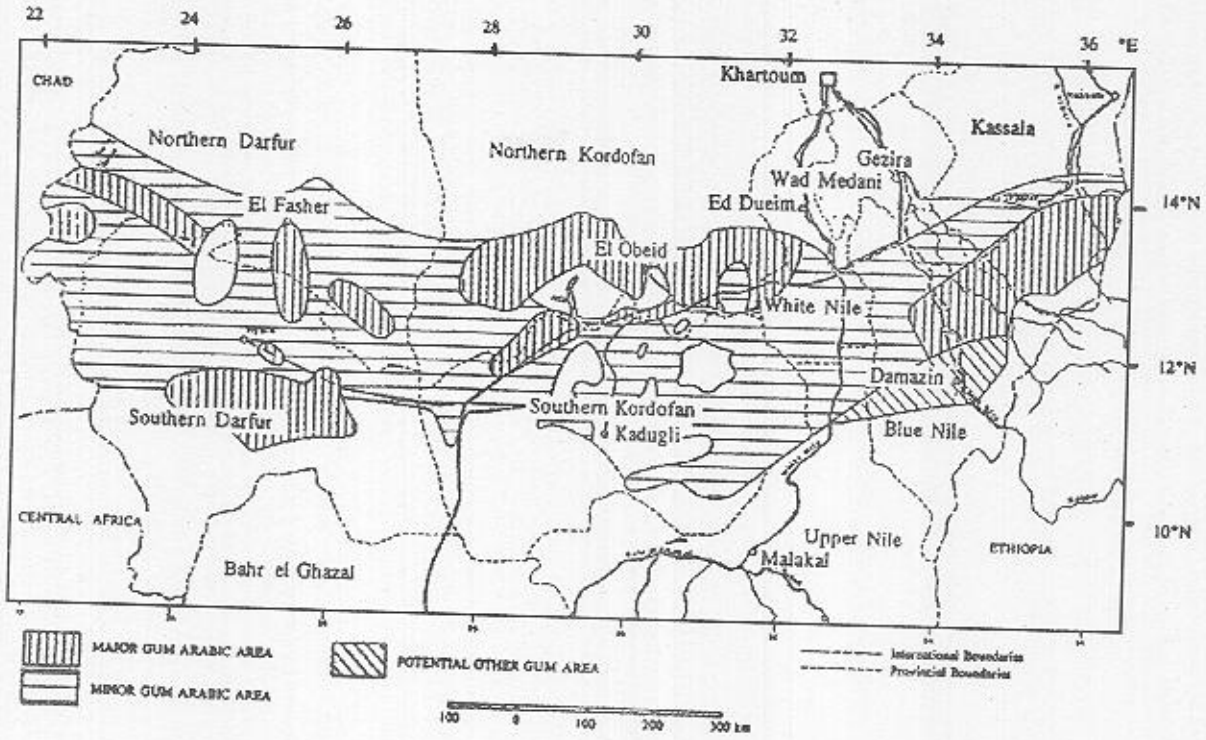
The serviceability of any methodology or the compiled map is subject to further detailed work. With the use of GIS probably applied indicators can be arrived at especially if multi spectral imagery is used combined with NDVI and other relevant tools.

(4)THE GUM BELT

Originally mapping the gum belt is embedded in the known (Jackson and Harrison) map. Acacia Senegal (Hashab) is an important function in forestry research, and hence, it is closely monitored as a national wealth.

Since the time of compiling the vegetation map of the Sudan, there are noticeable changes in the gum belt; there is a south ward shift of the belt, and since the early 1970's acacia Senegal started to grow and produce in areas thought earlier to be unfavorable for hashab regeneration. At present Hashab is found along Bahr El Arab which necessitated updated for earlier works.

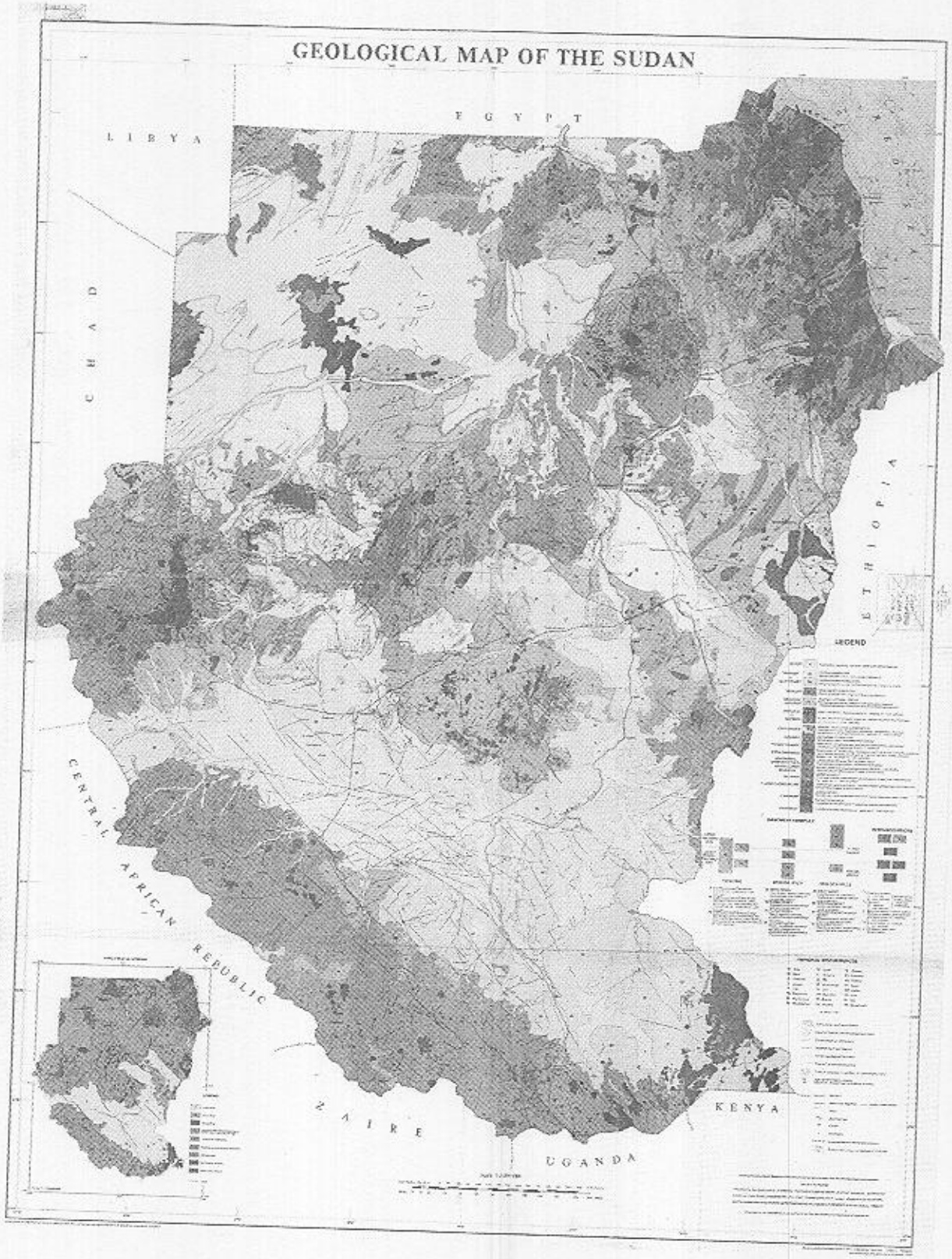
There is no clear cut methodology for compiling the hashab belt; except that it had an origin in the vegetation map of the Sudan; updating continued to be based on field monitoring. The main concern of forest research is the genetic improvement and sustainability of the resource (refer to mapping/forestry genetic resource)



(5)Geology

The geological map is not one entity; rock age, origin, hydro-geology and mineral contents are part of the themes of interest to geologists. What characterizes the geological maps is that research results were automatically used to update the maps. Up to the 1970's the standard for surveys was the Ordinance Survey 1:250000 sheets; the use of the GIS had dramatically speeded updating the geological map.

In practice; for applied policy magnitudes with respect to agricultural development, the geological map per-se has limited use for the simple reason that the geology residual is found in soil. The human existence on a particular tract of land is a de-facto; what will remain important is what attributes of geology and technical advice should be considered.


GEOLOGICAL MAP OF THE SUDAN
EGYPT
LIBYA
CHAD
ETHIOPIA
CENTRAL AFRICAN REPUBLIC
ZAIRE
UGANDA
KENYA
LEGEND

THEME MAPPING:

Through-out the mapping initiatives, it remains that the Ordinance 1:250000 remains the standard and most stable for geo-referencing, though many places were not shown and others have vanished.

It is important to distinguish theme mapping from the others, in that the subject matter was pre-determined; mapping incorporates the methodology and findings within the frame of reference, nation-wise or belt. Much of the out-put is original, illustrations will be provided separately

Four works will be cited:

1) The National Aerial Livestock Census, 1976

2) The Technical Assistance in Drought preparedness and Desertification,

3) The AFRI-Cover

4) Livestock production and Sahelian Range Land Potential- Sudan

The National Aerial Livestock Census:

The survey was carried by Resource Management and Development in 1976 for the Animal Resources Administration. The results constituted the base-line for subsequent animal wealth estimates in the Sudan as no comprehensive survey was conducted since then. The same company was employed by HTS in 1976 to conduct a wet and dry season surveys to comprehend the seasonal fluctuations in biomass densities in the Savannah Development phase II project. For the Savanna Development Project, comparison between the findings of the aerial census and estimates of the socio-economic surveys showed some discrepancies, but the overall judgment is that the aerial census was internally consistent.

The methodology of Resource Management and Development combined stratification and sampling in which (56) eco-types were identified across the whole country; these were further subdivided into strata. The transit lines within each stratum are a residual of the area; these lines are flight lines and counts are taken systematically at time intervals.

Satellite images and aerial photography were used to delineate the boundaries of the eco-type; for each the area is measured in squared kilometres, a short description of the vegetation cover, the cover category, geomorphology, conventional soil type, drainage pattern, topography and descriptive use intensity.

The information gathered through transit lines and ground checks were converted to density indices, covering resource availability and intensity of use.

The survey methodology and out-put were published; one volume for each province, a national summary and explanatory volumes for the methodology and other related topics. The overall number of volumes is 32.

The characteristic features of the survey are being comprehensive, and numeric and introduced a nation-wise frame work of eco-types; in that it carefully avoids assigning conventional nomenclature to these eco-types other than being distinct in soil type and composition; these differences since the mid 1970's were being continuously recognized by CGIAR in farming system research and ILCA in evaluating range resource and do not vary from the land system approach adopted by HTS.

Currently, the only complete set is available in the Ministry of Animal Resources; and possibly not before long some of the copies might be lost. What to be highlighted is that the boundaries of these eco types were projected in a set of 1:250000 maps in custody of Animal Resources.

2) The Technical Assistance in Drought Preparedness and Desertification

This work is provided by HTS to the National Drought and Desertification Unit (NDDU) in 1994; the area covered extends between 10 and 20 deg. N latitude; and was published in two map albums.

Map compilation was from several sources, in part, it does not go deep in detailing conventional themes of atmospheric or soil parameters but picks the salient features but mainly focuses on drought as a phenomena; in that long term rainfall averages were compiled in one map which illustrates the high variability of rain fall. What to be stressed is that any policy or research initiative based on long term averages would by necessity embody the standard deviation of the mean which on ground reach 50 kilometers on either side of the line.

What is new in the study is re-organization of NDVI values in discrete pixels and annual average for each individual pixel was compared with the mean value as indexed for worse or better; the base year was 1984 and readings were taken up to 1994.

Volume one contains the general environmental themes and volume two contains the main issue, the NDVI values were shown in annual maps; the prevalence of the 1984 conditions can be easily followed through the succession of maps. What can be inferred from the maps review is that the long term averages as a working criteria, can hardly materialize on ground unless there is no other alternative. The notion is quite important for rural livelihood and in conformity with the map showing the variability of the long term averages. copy of the raw data and the published work is in custody of the Soil Conservation office, and a copy can be found in the Remote Sensing Unit of ARC hosted by U of K (with Faculty of Engineering); to be noted that the data can be accessed by ARC/INFO.C

The main strength of the work is the methodology as mentioned in the report that (The vegetation condition index (VCI) was developed by Felix Kogan at NOAA/NESDIS. The purpose of the VCI is to high-lighten those areas which are experiencing either surfeit or deficit in their NDVI response compared to the range of values which have previously been experienced at that location.)

As a follower, a predictive model can be set where (The index works by comparing an NDVI value (for a given time interval) with maximum and minimum NDVI values which have occurred at the same location over the period of archive-for this data set twelve years. The range of values experienced at that location is divided in to a linear scale of 0- 100.....VCI values less than 30 have been shown to be correlated with drought condition) and that, the frame work is available and accessible for free (The NOAA satellite imagery used to compile these maps is from the FAO

ARTEMIS Project, data distributed by IGADD.). – same frame work of Afri-Cover. Pixels can be fit to any administrative boundary.

The standard of the pixel scheme is that of the UN;

3) The Afri-Cover

This work is the latest update of the vegetative cover of the Sudan; the difference with the Harrison and Jackson is in the vegetation composition, though the Afri-Cover provides indices for the density. Overlaying the two could have maximized the usability of the information except that there are a lot of changes to the situation described by Jackson or Harrison.

Eight categories are identified; cultivated, urban, bare/rock areas, water bodies and the other four describe the state of vegetation.

Currently the full national volume was restructured states wise. The objective was clearly to maximize the use; for this purpose a soft ware was provided with the package for further amendments and enhancement and suggestions for other open source GIS packages

The difference between this work and the HTS work is that in Afri-Cover NDVI values were interpreted to depict the vegetation condition, and that of HTS compares values, in that, the situation of food availability in any year can be compared with the situation in an other provided that a base year approach adopted so that the average should not be moving average.

4)Livestock production and Sahelian Range Land potential/ Sudan:

This work is a complementary part for a study of range condition in the Sahel Belt in the Francophone countries in what is considered the range belt extending roughly between 10 and 12 lat N. In the Sudan it is projected in 17 frames on the Ordinance maps of 1:250000 sheets

The objective of the survey as mentioned is to provide a base work for the Range Authorities to build upon in monitoring and further improvement. The study was conducted by CTA for the Range and Pasture Authorities. Many Sudanese scholars collaborated with CTA to execute the survey. The final report is published in an atlas.

The methodology adopted base units very similar to the eco-types; the companion key describes the land form situation within each unit and some hints about the use.

On the conceptual framework, the survey settled on a number of ecological units to match the 1:250000 scale adopted; which means that the number of units is dependent upon the scale used; on the text the amount required for supporting an animal unit was calculated, that leaves quantification of feed in the respective ecological unit to be of practical use.

What is noted in the text is that; the virtual lack of basic information on ground lead to push aside these land frames and instead, estimates of the carrying capacity were based on zonal belts of isohyets which is a clear miss-match.

LAND USE:

Under conditions of uncertainty and loose governance it is reasonable to expect competition between various land uses to be the norm; which is factually supported on ground.

In the Sudan, mapping land use was pioneered by Professor Lebon in his work (Land Use in the Sudan) describing the situation in the 1950's, few geographers did contribute to the theme in its natural setting or the legal aspects.

The competing forces that altered the description of Lebon are the expansion of the traditional cultivation since the mid 1940's, the introduction of the Mechanized Farming, the polarization of livestock coupled with deteriorating environmental conditions and the spread of water-yards (the anti-thirst campaign). This last factor was responsible for collapsing the self regulating mechanism of eco-types where the limitations of natural water (as opposed to man-made) used to control the intensity of use. The continuous deterioration of environment can be seen in the southerly shifts of the wet season grazing areas.

These changes renders mapping land use as a frozen shot in time, describing the situation at the compilation time of the map. This does not include indicative land-use planning which was purposively drawn in support to a development initiative. In that, two important works will be highlighted, the Land and Water Use Survey in Kordofan (Doxiadis) and Southern Darfur Land use Planning Survey.

Land and Water Use Survey:

The survey was implemented by Doxiadis Associates in 1962-1967; the study focused on land and water related issues against a background of a conceptual frame work developed by Doxiadis (EXISTICS) that the relationship between man, nature, shells (settlements), space and network should be at equilibrium.

The results of the survey were published in volumes and an atlas of maps reflecting the findings. The importance of the survey stems from highlighting the main concept. Additionally it introduced the hierarchy of services as a working criteria and an operational frame work for the central place theory of Von Thunin; all of which had been adopted in the early works of the Rural Development Department.

It is to be noted that reclamation of the Gardud soils and underground water storage tanks in sandy areas were started in the study period, besides extensive studies on Acacia Senegal.

Southern Darfur Land Use Planning Survey (SDLUPS):

The background of the study is UN call that the savannah belt of Africa will not cope with rising population needs, given the repercussions of the recurring droughts after 1964. The British Government (ODM) came in to pilot in an area of high potential in South Darfur between 10 and 12 lat N., and 28 and 29 longitudes. The area east of 29'Th degree longitude up to the eastern National frontiers was taken by FAO.

The outcome of the survey is a guiding land use plan stipulating structural changes in land use. As an effect, the UN contracted the consultant to expand the survey to a Savannah Development Project; a phase II in Eastern Darfur and an-other phase to cover Kordofan. A fresh cover of low flight aerial photography at a scale of 1:20000 was provided, augmented by hard copies of satellite imagery to cater for areas south of latitude 10 N.

The two documents of Darfur were amalgamated in one proposal; featuring an executive organization (WSDC), an independent research authority for western Sudan (Western Sudan Agricultural Research Station), and an off-take drain (LMMC). High lights of the land use plan were skimmed in the World Bank grey cover as a potential financer. For some geo-political reasons (WSDC) was scaled down to a piloting phase

The survey of (SDLUPS) adopted for the first time the land-system approach; defined as an aggregate of physical parameters jointly can be recognized as one set distinct from the neighbouring area; these are reflected in the resource endowment that controls the mode of use and intensity; these land systems formed the bases for future planning served by a outstation research centers and a web of focused extension, all the functions reciprocate together. The experience gained from The Land and Water Survey was incorporated. One of the important findings with respect to stock routes is the web nature of the system implying that speaking about an eastern, western or central stock route is fictitious.

The mapping process followed the same these that land systems are a complex of soils; the suffix indicates the system name, geomorphology, soil and vegetation. System characteristics assume similarity in cultural patterns, constraints, size and distribution of population.

DEVELOPMENT PROJECTS:

This part deals with projects that are geared to relax a pre-conceived constraint(s); in essence they don't have an explanatory or exploratory nature. The build-up of most development projects reflects the operational principle underlying project inception, notably the bottom-up and community empowerment approaches.

Map-work in such projects utilizes published work and geo-referencing to delineate the project boundary and overlays. Compilation is at best distributional in nature, with the exception of existing land-use which under the present circumstances is dynamic in nature.

In this context the IFAD's (special areas) projects are part of the bottom-up scenario and (credit) projects naturally fall in the community empowerment approaches. The main thrust of development projects is in the statistical analysis.

NGO'S:

The relief organizations have devised operational concepts and early warning mapping, notably the (food Economy Zones) and (Risk Mapping) which are documented in web sites. These are based on

field observation in areas of their activities. The time horizon for any of these methodologies is the current year; more or less, organization of the common expectations of the future food situation measured against the likelihood of crop failure in the particular rainy season. The acquired experience of the interpreter is critical in evaluation.

The NDVI indices serve similar purpose. The proxy values for NDVI are crop performance in the rainy season; it is not by necessity measuring food crops but all the vegetation including food crops. This does not entail a unified scale for food crops and range condition because in years as bad as 1984 and 1985 they performed differently.

All these methodologies are short run, but the inherent problems are the lack of quantification and the time lag required to mitigate the worst effect.