REPUBLIC OF KENYA

COUNTY SPATIAL PLANNING IN PASTORAL AREAS

TOOLKIT (II): RESEARCH, MAPPING AND SITUATION ANALYSIS

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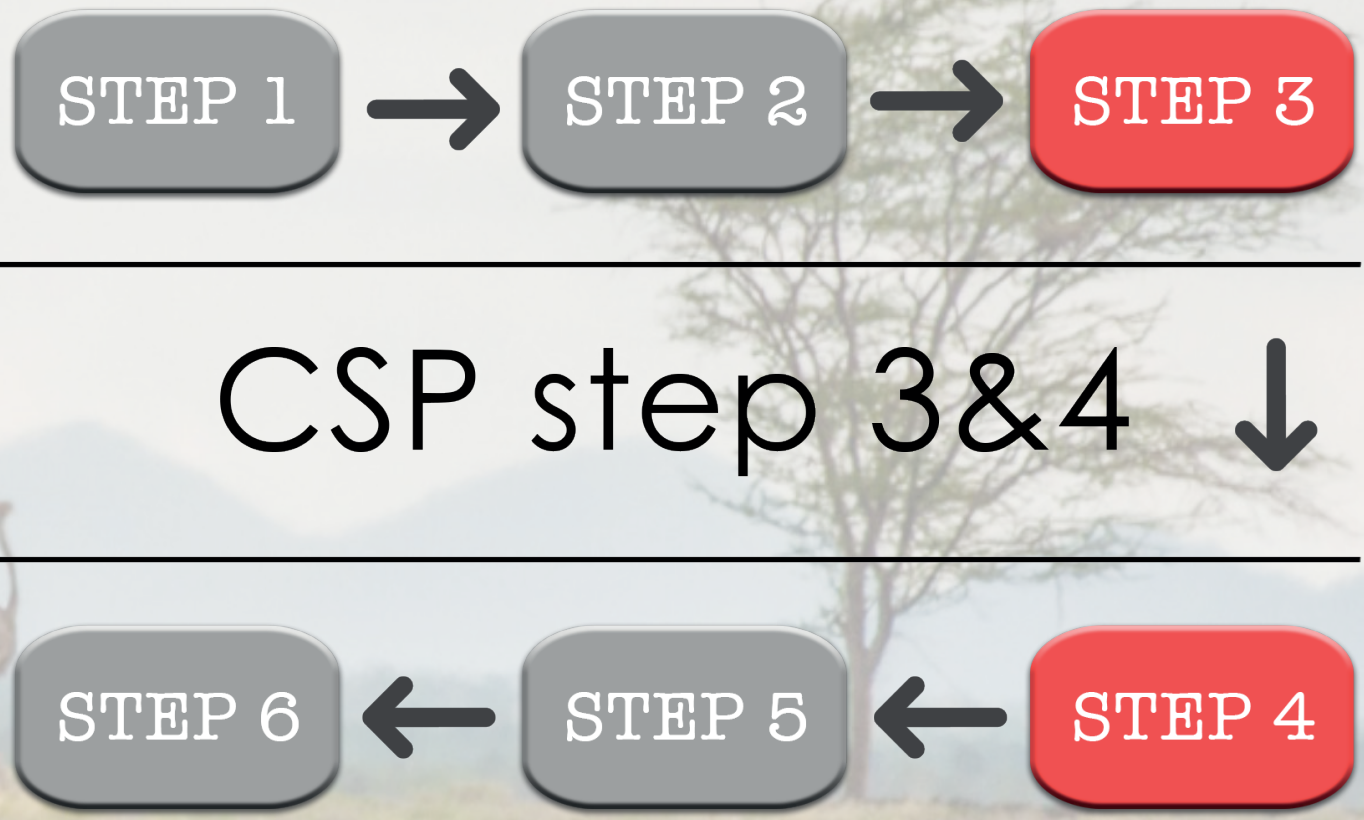
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ABBREVIATIONS & ACRONYMS

CIP	Capital Investment Plan
CGIAR	Consultative Group on International Agricultural Research
CSP	County Spatial Plan
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
GIS	Geographic Information System
ILRI	International Livestock Research Institute
LUA	Land Use Alternatives
RECONCILE	Resource Conflict Institute
NLC	National Land Commission

FOREWORD

This Toolkit has been developed with special recognition that County Spatial Plans in the pastoralist areas are the primary instruments to catapult the counties to higher pedestal of development.

The Toolkit has been prepared subsequent to Toolkit (I) which guided the pre-planning and vision and objective setting stage in the County Spatial Planning process. This Toolkit elaborates on the next steps which are: Research, Mapping and Situation Analysis.

The County Governments will find a number of tools herein, particularly useful and handy in delivering on these crucial steps in County Spatial Planning process.

The Toolkit will serve as a legitimate basis for engagement between the Commission as a monitoring and oversight agency and County Governments as Plan preparatory authorities.

The Commission recommends the Toolkit as a legitimate advisory to County Governments in Pastoral Areas as a necessary reference and guide in preparing their County Spatial Plans.

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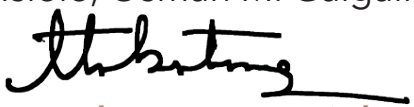

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PREAMBLE

ABOUT THIS TOOLKIT

This Toolkit expounds on Steps 3 and 4 in the County Spatial Planning: Monitoring and Oversight Guidelines that focus on Research, Mapping and Situation Analysis. The purpose of the Toolkit is to enhance clarity, simplify the activities and expectations in that stage of the County Spatial Planning process.

The Toolkit is divided into two main parts which relate to Step Three and Four. Each of these parts are broken down into several sections that define key activities and tasks that need to be carried out as part of each step and each contain a number of tools.
The tools are:

- → Preparing a Base Map
- → Checklist for Preparing Thematic Maps and layers
- → Participatory Mapping
- → Participatory GIS
- → Incorporating Negotiated Resource Sharing into the CSP
- → Carrying out Socio-Economic Surveys
- → In-Depth Analysis of Conflict Trends and Hotspots
- → Data Storage and Management Planning Checklist
- → Data Processing Checklist
- → Data Analysis Checklist
- → Using Rangeland Monitoring Information
- → Data Interpretation and Synthesis Checklist

WHO ARE THE TARGETED USERS OF THE TOOLKIT

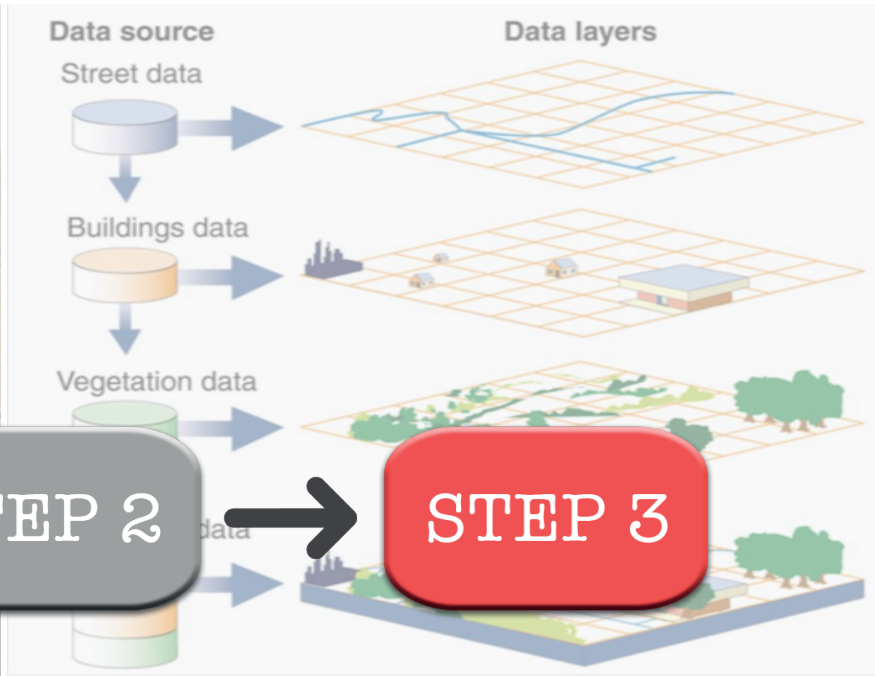
This Toolkit is intended for use primarily by County Government Land Use Planners responsible for preparing County Spatial Plans as well as Consultants who may be contracted to prepare County Spatial Plans by County Governments. It is also an essential reference for: Chief Officers, County Executive Committee Members, Members of County Assemblies, Development Partners, Civil Society Organizations and Development Agencies in the Pastoral Areas among others.

The Toolkit may also be a reference for students of planning at the universities. Agencies charged with monitoring and overseeing development activities in counties may find the Toolkit useful.

HOW TO USE THE TOOLKIT

The Toolkit is meant to guide the planning teams on how to carry out the Research and Mapping and Situation Analysis Steps and is adaptable to the different contexts pertaining in the different counties.

The Toolkit should be used hand in hand with Toolkit I (Pre-planning, Visioning and Objective Setting) and Toolkit III (Developing Scenarios and Plan Proposals). Further, the Toolkit should be used alongside other advisories issued from time by the National Land Commission including: *County Spatial Planning: Monitoring and Oversight Guidelines,* Exemplar Format of a County Spatial Plan and the annex to the guidelines on *County Spatial Planning in Pastoral Areas*.



STEP 1 → STEP 2 → STEP 3

CSP step 3 ↓

RESEARCH & MAPPING

STEP 6 ← STEP 5 ← STEP 4

3.0 INTRODUCTION

The **Research and Mapping** step is geared towards carrying out a deliberate, structured and guided study that will critically examine the current situation in the county. It entails: collecting relevant spatial and non-spatial data on rangelands, livestock production, livestock mobility, and other dimensions of pastoralist livelihoods and land use.

This step includes:

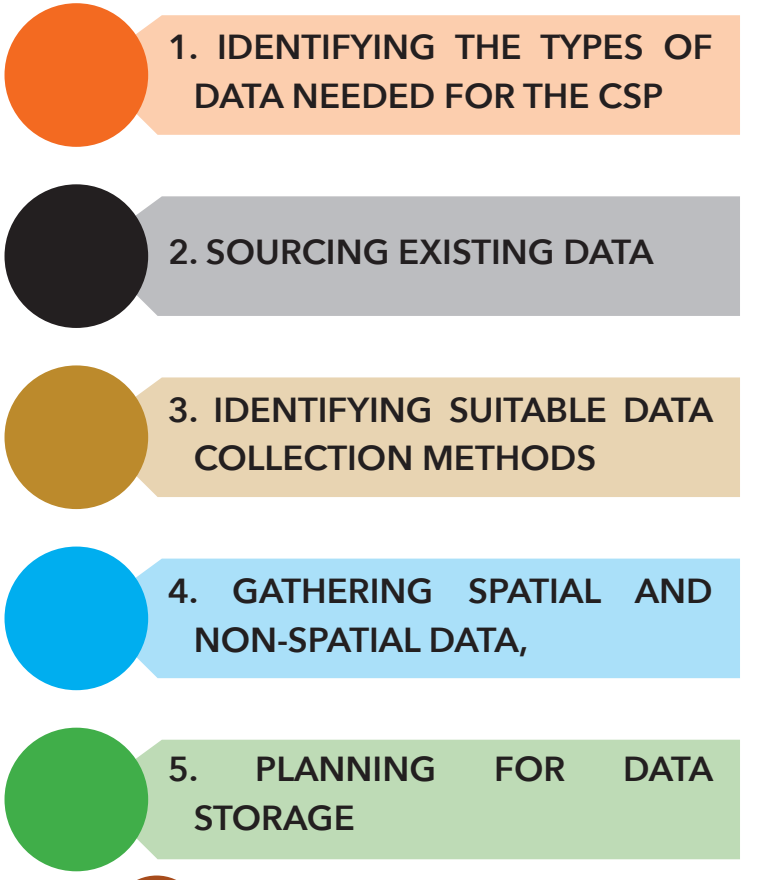


Figure 3.1: Key Activities in Research and Mapping Step

Purpose: To describe and explain the current situation/conditions in the county.

Table 3.1 Research and Mapping Steps

ACTIVITIES	TASKS	OUTPUT
3.1 Collecting and generating maps and spatial data	3.1.1 Preparation of base maps 3.1.2 Prepare thematic maps and GIS layers: 3.1.3 Vegetation and rangeland condition 3.1.4 Soils 3.1.5 Water resources 3.1.6 Land tenure, governance and social organization 3.1.7 Land use 3.1.8 Stock routes and wildlife corridors 3.1.9 Conflict 3.1.10 Identify and map disaster prone areas	Base maps Thematic maps and GIS layers

ACTIVITIES	TASKS	OUTPUT
3.2 Collecting and generating non-spatial data	3.2.1 Socio-economic survey 3.2.2 Stakeholder forums/ workshops 3.2.3 Focus group discussions 3.2.4 Household questionnaire survey 3.2.5 Desktop study	Raw data Draft reports
3.3 Data storage and management	3.3.1 Set up a GIS database system 3.3.2 Set up cloud storage and backup 3.3.3 Printing maps 3.3.4 Develop a dissemination system (web site, etc.)	GIS database Printed and pdf maps Printed reports and pdfs A dedicated section within the County's web site

TOOL 3.1-A: PREPARATION OF BASE MAP

A **base map** depicts background reference information. It can be presented in form of a **map** or chart showing certain fundamental information, used as a **base** upon which additional data of specialized nature are compiled or overprinted. A base map has essential elements such as:

PHYSICAL ENVIRONMENT

- Geographical features; e.g. hills, valleys, rivers
- Vegetation e.g. forests, swamps
- Water bodies
- Wildlife conservancies, parks and reservations

BUILT ENVIRONMENT AND SETTLEMENTS

- Settlements
- Prominent landmarks
- Existing and planned developments
- Transportation infrastructure (e.g., roads, bridges, railways, airstrips, pipelines)
- Dams, boreholes and wells

SOURCES OF DATA FOR BASE MAPS:

- Topographical maps
- Satellite imagery
- Aerial photos
- Cadastral layers/maps
- Ortho-photo maps
- Existing maps and plans

CHECKLIST - KEY ELEMENTS ON THE FINAL MAP SHOULD INCLUDE:

- ✓ The Map be titled appropriately;
- ✓ Appropriate scale (large formats preferably A1 or A0);
- ✓ North arrow
- ✓ Detailed legend according to planning standards
- ✓ Defined boundaries (wards, sub-counties, county, national)
- ✓ Georeferenced grid lines
- ✓ Contours
- ✓ Boundaries of the planning units

TOOL 3.1-B CHECKLIST FOR PREPARATION OF THEMATIC MAPS AND LAYERS

Thematic maps depict the spatial pattern of a particular theme. These themes relate to physical, social, political, cultural, economic, sociological, or any other aspects of the county, illustrated in a number of maps in layers as described below:

- **Physiographic Map** – Topography, soils, geology and rivers
- **Natural Resource** – habitat, parks, reserves, forests, wildlife & archaeological resources, water resources, cultural and sacred sites.
- **Transport and Infrastructure**
- **Human Settlements** - urbanization, rural development patterns, population & demographic patterns
- **Local & Regional Economy** – lland use patterns, commerce, industrialization, mining, service industry & institution, tourism.

The thematic maps prepared need to focus on land use planning in rangelands and pastoral areas. There are key aspects that affect these areas that need to be particularly researched and analysed.

Checklist: Data Needs for Key Thematic Maps

Table 3.2: Data Needs for Key Thematic Maps

THEME	TYPES OF DATA NEEDED	METHODS
Vegetation and rangeland condition	✓ Pastoralists' pasture categories (rainy season, dry season and drought pastures) ✓ Vegetation cover/ ecosystem type (grassland, bush land, woodland, etc.) ✓ Productivity ✓ Invasive species ✓ Overuse/underuse of pasture areas ✓ Trends in rangeland condition	• Rangeland monitoring (quantitative and qualitative) • Remote sensing • Range inventory and analysis • Participatory GIS • Aerial photography and collection of field data
Climatic and Weather Patterns	✓ Temperature patterns and trends, ✓ Rainfall ✓ Humidity ✓ Wind patterns ✓ solar irradiance	•Source data from meteorological department •Climate change directorate

THEME	TYPES OF DATA NEEDED	METHODS
Soils	✓ Soil profile ✓ Soil catena ✓ Surface soil conditions	• Biophysical surveys
	✓ Subsurface soil conditions	• Geological surveys • Remote sensing • Soil inventory and analysis • Aerial photography and collection of field data (GPS mapping)
Water resources	✓ Catchments/ watersheds ✓ Water points/sources ✓ Types ✓ Distribution and location ✓ Quality ✓ Quantity	• Watershed analysis using remote sensing and GIS techniques • Mapping and catchment delineation • Hydrological surveys • Ecological monitoring

THEME	TYPES OF DATA NEEDED	METHODS
Land Tenure, Governance and Social Organization	✓ Cadastral information with boundaries ✓ Community conservancies, group ranches, and other community natural resource management territories ✓ Protected areas (gazetted forests, game parks and reserves, conservancies) ✓ Traditional pastoralist territories ✓ Livelihood groups & zones ✓ Ethnic distribution	• Survey and mapping • Participatory mapping • Participatory GIS • Remote sensing
Land use	✓ Local, community-managed pastures ✓ Shared pastures areas (e.g., drought reserve pastures) ✓ Livestock distribution and density ✓ Wildlife distribution and density ✓ Settlements (distribution and pattern)	• Survey and mapping • Participatory mapping • Participatory GIS • Livelihood surveys and analysis • Remote sensing

THEME	TYPES OF DATA NEEDED	METHODS
Stock Routes and Wildlife Corridors	✓ Major functional stock routes ✓ Major functional seasonal stock routes ✓ Major non-functional (blocked) stock routes ✓ Minor functional stock routes ✓ Minor non-functional stock routes ✓ Other stock routes ✓ Wildlife migration corridors	• Participatory mapping • Participatory GIS • Livestock GPS collaring
Conflict	✓ Conflict hot spots ✓ Conflict trends	• Participatory mapping • Conflict monitoring

TOOL 3.1-C: PARTICIPATORY MAPPING AND GIS

Participatory mapping is the process of community members and other stakeholders creating maps of local resources, resource use patterns, challenges and their vision for the future. Elders, herders and other community members can have a wealth of knowledge on rangeland resources, land use, location of conflicts etc. Participatory mapping and GIS involve mobilizing this knowledge particularly through workshops and the use of GPS units to create maps that will inform a county spatial planning process.

KEY PRINCIPLES

Table 3. 3: Key Principles in Participatory Mapping Processes

Social Inclusivity	• Participatory mapping is a process that ensures there is full inclusion of community members in an initiative that have implications on their lives and policy processes. • It can be representative of communities, as well as individuals. • It should ensure; transparency, accountability, gender sensitivity, openness among others.

Commitment to Community Control and Ownership	• The process and outputs must be clear to community and other stakeholders that the process is community driven therefore own the products. Mechanisms for control, storage and management defined. As such, there are possibilities and very important to seek Free, Prior and Informed Consent with the communities as any mapping process begins. • In rangelands and pastoral areas, natural resources are traditionally and communally managed and used thus, the understanding that they own the process is critical.
Empowerment	• Recognize that mapping has implication on core areas of and for empowerment including; social, economic, political and personal transformations.
Learning	• Through land use planning maps, indicate overall and special arrangements of land use types, according to land resources/land suitability and the demands of economic and social development. There are two important contributions of the thematic maps. First, they provide a template for making land use maps. The second contribution it prescribes the scope for settlement sprawl and the distribution of pasture and farm lands.

A participatory mapping process is significant and potentially very powerful. The exercise will elicit discussions, and represents and validates local spatial knowledge.

A) IMPORTANT PILLARS

- Spatial specificity: information about local interests & priorities, values and perceptions.

- Local and external knowledge: local, indigenous knowledge, sacred knowledge, gendered knowledge.
- Visual images as "spatial narratives": Pictures are rich in information and shared understanding, and increase information both quantitatively and qualitatively. Visual images often provide the conviction' factor, though this may have negative as well as positive implications.
- Multi-sourcing: involves multiple processes of people's participation in knowledge identification and selection. There are many opportunities for cross-checking and alternative validations.
- Capacity-enhancement: communities / groups can be empowered by involvement in PGIS processes – improving self–confidence and technical/ political capacities.
- Multi-level and multi-stakeholder involvement: Maps and information derived from maps at county and higher levels can feed into participatory mapping done at planning area and lower levels, and vice versa. Rangelands are used and managed at different scales from pastures managed by a single community to large rangeland landscapes encompassing multiple communities; a multi-level approach to participatory mapping helps take this into account.

B) VALUE ADDITION TO CONVENTIONAL MAPPING

- Handle multiple data layers (overlays) for analysis and presentation;
- Work across multiple scales and topographies (scale comparisons, zooming-in);

- Combine data on different issues (eg transportation, hazards, socio-economic), and from different formats (eg satellite, paper) and sources (local, external, scientific);
- Undertake spatial analysis of e.g. proximity, buffer zones, and threshold distances overlaying different types of land use, efficient routes and networks (e.g. stock routes).
- View time series - for temporal comparisons,
- Visualise –spatial visualisations (maps, GIS) are particularly valuable in scenario development and exploration. e.g. to consider alternative futures;
- Handle spatial queries (where is ...? what is at ...?);

The chart below illustrates a summary of steps in participatory GIS:

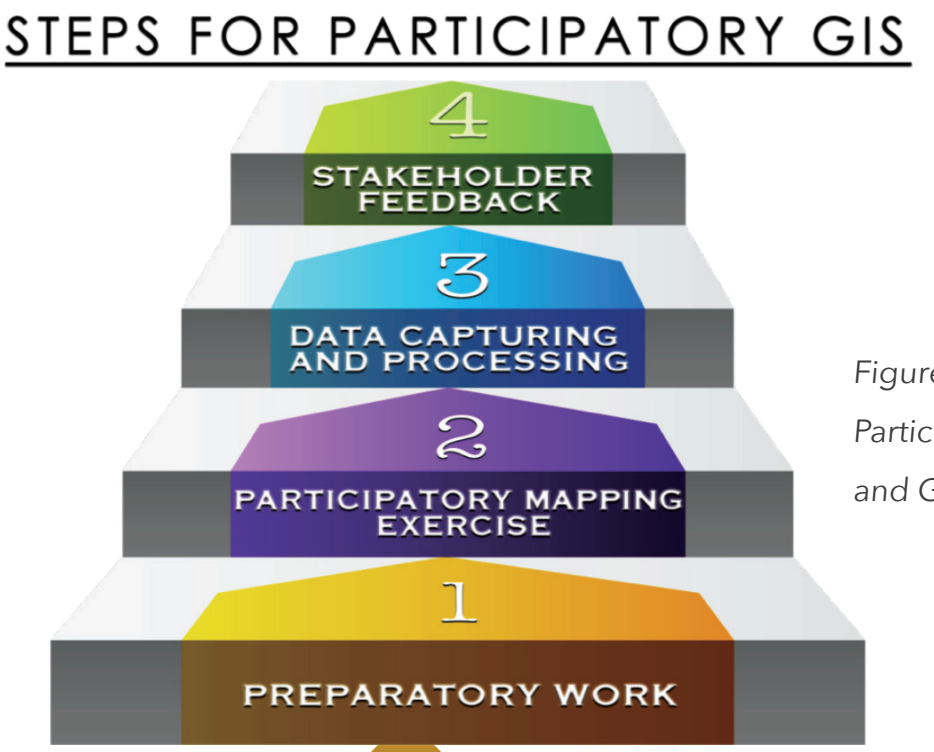


Figure 3. 2: Steps for Participatory Mapping and GIS

TYPES OF RESOURCES TO INCLUDE IN THE MAPS

- Livestock routes
- Shared drought reserve pastures
- Water points
- Livestock-related services and infrastructure
- Conflict hot spots

STEPS IN PARTICIPATORY MAPPING AND GIS

STEP 1: PREPARATORY WORK FOR PARTICIPATORY MAPPING	
Guidelines	**Requirements**
✓ Collect primary and secondary data about natural resources and socio-economic conditions. ✓ Select site for participatory mapping ✓ Design the criteria for a participatory group discussions and participants ✓ Choose the appropriate base map print-out or sketch, preferably an A0-size is recommended.	• A coordinate system, grids, scale and a north arrow need to be printed on the base map. • The map projection and map date • Clear names of the village/s • Stationary • A handheld GPS with appropriate accuracy.

STEP 2: PARTICIPATORY MAPPING EXERCISES	
Guidelines	**Requirements**
✓ See Tool 3.1-D	
STEP 3: DATA CAPTURING AND PROCESSING	
Guidelines	**Requirements**
✓ Spatial data should be entered into a GIS program by the GIS expert for further processing after data collection through a participatory resource mapping. ✓ Data transfer options: o Scan the papers for data transfer, o Onscreen digitizing of geographical features visible on the base map. ✓ The projection system of the secondary GIS data should be the same as that of the aerial photograph to be used for overlaying purpose. ✓ Every vector feature of the resulting GIS data file (such as shapefile) need to have an identity code ✓ (ID) for the land use class and one identity code for the local names. ✓ Finally, the map layout has to be designed. ✓ Apply cartographic conventions for the colour, symbol elements such as; o Map title, scale, coordinate grids and the date of map compilation has to be added to the map.	• Transparent drawing papers • Thin permanent pen

STEP 4: FEEDBACK TO STAKEHOLDERS	
Guidelines	**Requirements**
• After the data analysis and map compilation are finalized, a printout of the participatory photo-map or sketch map should be taken back to the local communities so that the product can be verified and be re-adjusted if necessary. • Hand over to the villagers; o Original base map after data capturing has been done, o Sketch maps for record keeping.	• One copy of the sketch map should remain in the village to be used as a decision-making tool by stakeholders during stakeholders meetings.

Knowledgeable experts from the community, NGOs, and government draw maps showing:

- The locations of key features, conflicts, and shared resources including common livestock migration routes (status maps);
- The desired locations of key resources if any of these should be changed or added (vision maps).

STEPS IN PARTICIPATORY MAPPING

ASSEMBLE KNOWLEDGEABLE EXPERTS.

Convene a workshop that brings together knowledgeable people from across the territory. These "experts" are people who are very familiar with the mobility patterns of livestock keepers and may include community representatives, elders, and personnel from government and NGOs.

Customary leaders, where relevant, should also be involved.

PARTICIPATORY MAPPING AT MULTIPLE LEVELS

The participatory mapping work can be done at two or more levels: for example, a very large inter-county scale, county scale, and large landscape/inter-community scale. Normally the mapping at a broader scale will happen first, as it may inform the mapping that happens at the lower levels.

PRESENT THE BASE MAPS

Before the workshop, the team will have prepared base maps showing what is known about shared resources, and also showing what basic features such as administrative boundaries, and features such as livestock markets that are important to livestock production. See text box for types of features to include. This will also include maps made by participants in earlier workshops that mapped shared resources over larger scales. The maps are presented to the participants and explained.

MAP THE LOCATION OF SHARED RESOURCES.

In the workshop, you may divide the participants into breakout groups to map different sections of the territory, and then bring them together consolidate the work into a single map for the whole territory.

CREATE ONE OR MORE VISION MAPS

After creating the status maps in the workshop setting, participants can discuss if there are elements that need to change. Perhaps additional

livestock corridors are needed, or need to be moved to different locations. Perhaps there are areas that are not used as shared drought reserve pastures but which could be used in that way? Participants discuss these kinds of questions and then create a map showing desired changes.

NOTE TAKING

A note taker should make careful notes of the features that are mapped, of livestock movements, and of the discussions in the workshop. It will be helpful to note information about each point and each area that the participants map.

GUIDELINES AND REQUIREMENTS FOR PARTICIPATORY MAPPING WORKSHOPS

Guidelines	Requirements
✓ A series of targeted stakeholder meetings (pastoral areas sparse) ✓ Prepared short brief and agenda and introduction should provide: the purpose of mapping the area (for example the land use to be mapped, grazing areas etc), ✓ Sufficient information about the approach of participatory mapping, ✓ a brief explanation of the techniques to be used for mapping, ✓ An extra session should be conducted to answer any questions about the project. ✓ Mapping activities should start with either important or easily recognizable features like major infrastructure such as roads, and settlements. ✓ Participant to evaluate changes which have occurred over time. ✓ Different land and resources use changes need to be mapped as well.	• Community engagement plan • Event execution plan • Participants should be clearly informed in advance about the purpose of participatory mapping, • Advance notice and communication about the place and date of the meeting by sending out letters. • The meeting point should be on an elevated vantage point with a good view of the surrounding landscape. • The facilitator has to ensure that all users have equal opportunities to participate in discussions and express their real opinion and expectations.

GUIDELINES AND REQUIREMENTS FOR PARTICIPATORY MAPPING WORKSHOPS

Guidelines	Requirements
✓ Identification of rangelands resources such as grazing areas, water points, dry and wet season pasture areas reserve pasture area, migratory routes and timelines when these happen and why. ✓ As the boundary is a legal entity of land, it is important that the positions of known boundaries are marked accurately.	

IMPORTANT POINTS FOR THE MAPS

The maps can be drawn directly onto paper. These might be topographical maps or printed satellite images. Ideally, several printed maps should be available, especially if some of the mapping will be done in breakout groups. The scale of the maps will depend on what size of territory the mapping exercise is being done for.

GUIDING QUESTIONS FOR THE STATUS MAPPING EXERCISE

==> Where do people take different groups of livestock (check whether all livestock goes together of if different groups of livestock go to different places)? Note: this can include grazing areas, markets, water points, mineral areas, etc.

==> How often do people take livestock there?

==> Why do people take livestock to those places? What resources do they use? Are the same resources available anywhere else? If so, why is this area chosen and not another?

==> How long does it take (time and distance)?

==> Do people need permission to move livestock there? If so, who gives permission?

TOOL 3.1-E INCORPORATING NEGOTIATED RESOURCE SHARING INTO THE CSP

In rangeland areas, it is common for local communities, clans, and sometimes entire pastoralist ethnic groups to establish agreements on the sharing of certain resources with other communities, clans, or ethnic groups. These relate to grazing, livestock migration routes, access to drought reserve pastures, access to water points, or other resources. Rather than disrupting such agreements, the planning process can bring such agreements under the umbrella of the County Spatial Plan.

ANTICIPATED OUTPUTS:

- **A Thematic Map and GIS Layer for Existing Resource Sharing Agreements**
- **A short Text Document for each Resource Sharing Agreement**
- **Recommended Zoning for some of those Shared Resources**

PARTICIPANTS IN THIS ACTIVITY:

- Community leaders/representatives, including, where appropriate, elders/ customary leaders
- Representatives from any organizations, which may have assisted in establishing agreements.

STEPS:

1. Identify known instances of pre-existing resource sharing agreements.

This will be done largely through reaching out to knowledgeable people in the county including government officers, community leaders and in some cases staff of NGOs that do NRM and peace building work. During the Visioning and Objective Setting, and Research and Mapping phases of the planning process (CSP steps 2 and 3), various workshops and other meetings will be held with different groups of stakeholders. These workshops can also be used to gather information on resource sharing agreements that already exist.

2. Gather maps, GIS layers, and related information on the agreements.

For the resource sharing agreements that are identified, GIS layers or maps should be collected. In cases where these are not available but the geographic extent of the shared resources is known, County Land staff may be create a shape file for that agreement. A short document with basic information should also be created for each agreement (see Reporting/mapping format, below).

3. Create a consolidated GIS layer of negotiated agreements.

For ease of use later in the CSP process, in single, consolidated GIS layer of existing resource sharing agreements would be helpful.

4. Identification of selected resource sharing agreements for particular zoning designation.

Applying a special zoning designation to small pieces of land that are subject to a sharing agreement between two local communities would not normally be done. However, a particular zoning designation might be applied to areas of land that are shared according to agreements which meet the following criteria:

- → It is expected that the agreement will not require major amendment for the life of the County Spatial Plan (i.e. for roughly the next ten years);
- → The resource sharing agreement is accepted by most stakeholders and is not subject to legal challenge;
- → The resource is shared by users over larger scales: i.e., sub-county, county, inter-county, or transboundary (i.e., it is not simply a local agreement between neighbouring communities).

TOOL 3.2-A: CARRYING OUT SOCIO-ECONOMIC SURVEYS

A socio-economic survey is conducted through collection of primary and secondary data. It entails the identification of the types of data (primary and secondary, spatial and non-spatial), preparing a data checklist, identifying sources of data, and choosing the appropriate methods of collecting and storing the data.

The data will be represented thematically. These themes include:

- Physiography
- Population and demography
- Land
- Environment and Natural Resource
- Human Settlements and urbanization
- Transport, Infrastructure and services
- Economic base
- Land and Governance

Checklist of pastoralism/rangeland issues for the survey:

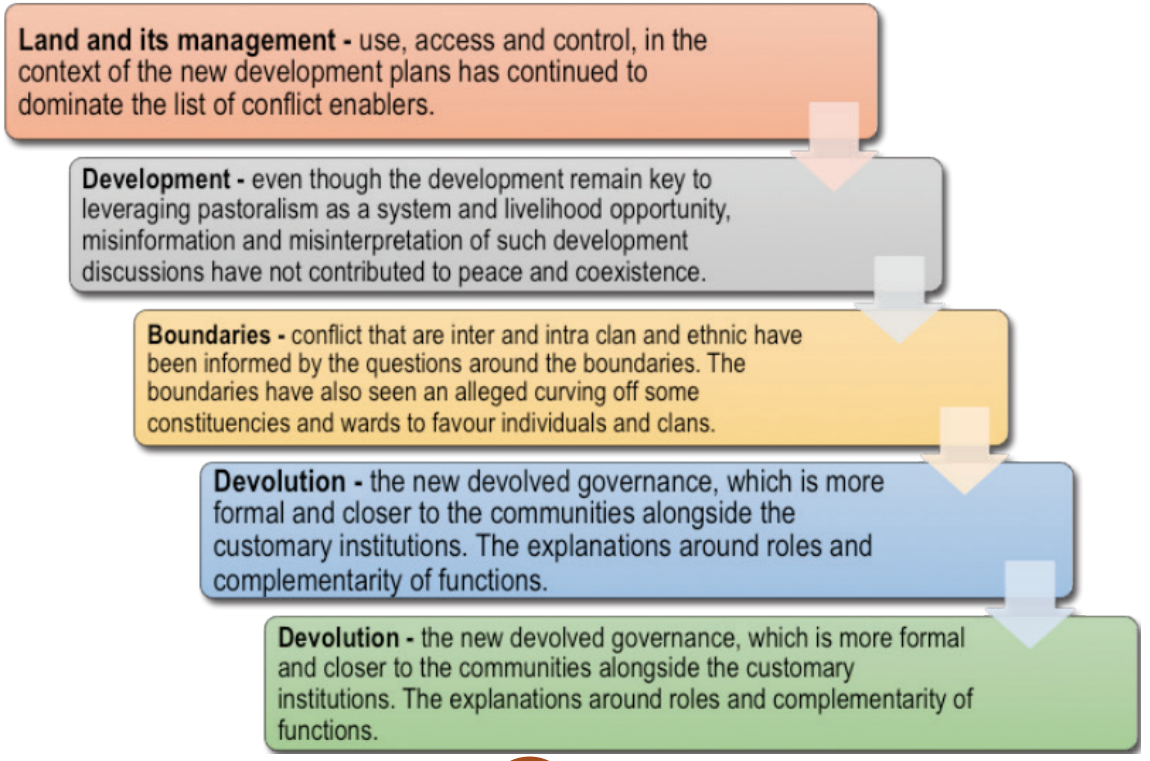
- ✓ Traditional resource management institutions and practices
- ✓ Livestock production and pastoral economy (incl. livestock health, breeding, marketing, etc.)
- ✓ Livestock-related services and infrastructure
- ✓ Gender dynamics in terms of production and land access
- ✓ Household and herd mobility

- ✓ Settlement patterns
- ✓ Conflict trends

TOOL 3.2-B IN-DEPTH ANALYSIS OF CONFLICT TRENDS AND HOTSPOTS

Even though it is true that the conflict in the pastoral areas has existed over time, it is also true that the conflict has taken different shapes and faces hence getting complex each time it escalates. The modality of use, access and control of natural resources, is a consistent factor of source of conflict. Different users struggle around how to secure the access to, control and usage of land for pasture applying different mechanisms.

SUMMARY OF THE ISSUES



STEPS FOR ANALYSIS

The initial stage of conflict intervention is the conflict analysis. This is critical because at this stage, there is a concerted attempt to understand all of the complex dynamics that have led to the escalation of the conflict along a very negative trajectory. In conflict training, this stage is important in helping participants/learners contextualize the conflict trends, types, actors, sources and identify relevant tools for analysis.

Examples of key questions to ask: "What is the state of affairs or pathway from latent conflict to sustainable peace? Why is it that problems have been exacerbated, relationships damaged, and violence employed?" It is important to put this to the context of conflicts between farmers and pastoralists analysing this from a perspective of common resources.

1. Problem Tree diagram can assist in assessing this "root causes" component in conflict analysis.

   The first step in constructing a Problem Tree is to identify the primary problem or issue. The "focal problem" and is written in the centre of the paper.

2. The second step is to identify the causes of the "focal problem."

   These become the roots of the tree are placed below the centre.

3. The third step is to identify the consequences of the "focal problem."

   These become the branches placed above the centre.

4. The fourth step is to establish a hierarchy of causes and effects.

Problems that are directly causing the focal problem go directly beneath it,

o Problems that are causing this layer go beneath them.

The same done with the effects placed above the centre

- o problems that are the effects of the focal problem go directly above it,
- o Problems that are the effects of this layer go above them.

TOOL 3.2-C IDENTIFY AND MAP DISASTER PRONE AREAS;

A hazard map highlights areas that are prone to or are vulnerable to a particular disaster. They are created for natural hazards, such as landslides, flooding and erosion. They help to prevent serious damage and loss of life.

Hazard maps will provide important information to help the county understand the risk of natural disasters and to help mitigate disasters. Hazard maps indicate the extent of expected risk areas, and can be combined with disaster management information such as evacuation sites, evacuation routes, and so forth.

The following are some of the key issues that should be considered to be undertaken in analyzing hazard prone areas:

- ✓ Identify the types of hazards that affect the county
- ✓ Identify and map out the areas with the help of the local community and relevant organizations
- ✓ Analyze the trends, the timeline and frequency of the disaster occurrences
- ✓ Identify any measures currently put in place to deal with the hazards

TOOL 3.3-A: DATA STORAGE AND MANAGEMENT PLANNING CHECKLIST

Digitizing is the process of converting geographic features on a paper map into digital format. The x, y coordinates of point, line and polygon features are recorded and stored as the spatial data. The feature attributes are also recorded during the digitizing process. It is the most common and labour intensive method to create a spatial database. The method is used especially when existing maps are available as the source of data. Coordinates of point features, line features and polygon features are recorded by manually pointing or tracing, using a digitizer table and cursor. The cursor position is accurately measured, by the device in order to generate the coordinate data in digital form.

This tool will inform the planning unit and other users the functionality of digitizing in order to capture the data in GIS. It is a systematic process.

- ✓ Set up the digitizer with digitizing software or GIS software available.
- ✓ Prepare and print out the map/s sketched or gathered.
- ✓ Digitize the point features. The file names should be around resources, features etc. for example; Settlements. Build the attribute table of settlements.
- ✓ Digitize the line features that represent roads. The file name should be given as Road. Build the attribute table of Roads.
- ✓ Digitize the line features that represent streams or water points. The file

name should be given as Stream. Build the attribute table of Streams.

✓ Digitize the polygon features that represent different land uses. The file name should be given as Land use. Build the attribute Table of Land use.

DATA STORAGE

This is an essential tool of technology structured to hold information. Data storage is a key component of digital devices that is relied on to preserver information. Whether you are collecting data or accessing existing data you need to consider:

- → How data will be stored?
- → Who will have access to the data?
- → How they will be able to access the data?

THE BASIC DATA MANAGEMENT PLANNING QUESTIONS

- → What data will you produce?
- → How will you organize the data?
- → Can you/others understand the data
- → What data will be deposited and where?
- → Who will be interested in re-using the data?

In this checklist, your requirements for data availability will be formulated by answering questions related to your research data in different stages if the research data lifecycle.

3.3.1 SET UP A GIS DATABASE SYSTEM

Develop a system of servers to store GIS data for not only storage but quick retrieval as well

3.3.2 SET UP CLOUD STORAGE AND BACKUP

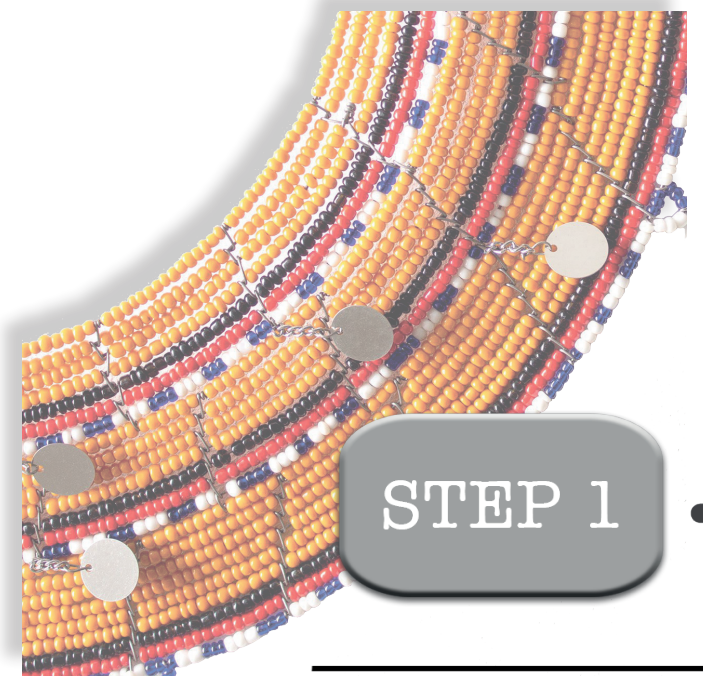
The county should have a backup system for storing the information (data). A cloud storage backup system is recommended.

3.3.3 PRINTING MAPS

- ✓ Look at paper quality
- ✓ Appropriate scale and fonts
- ✓ Quality of the plotter

3.3.4 DEVELOP A DISSEMINATION SYSTEM (WEB SITE, ETC.)

A dedicated section of the county's website can be developed to disseminate information on the county spatial planning process, including findings from the research and mapping step. Information should be made available in formats appropriate for easy use by the general population–e.g., PDFs of reports and maps–as well as GIS layers for use by various stakeholders.



STEP 1 → STEP 2 → STEP 3

CSP step 4 ↓

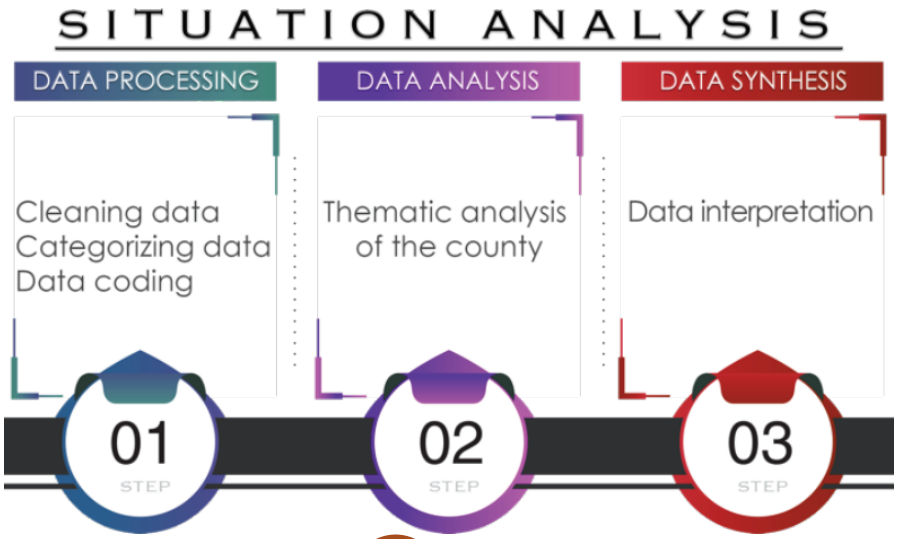
SITUATION ANALYSIS

STEP 6 ← STEP 5 ← STEP 4

4.0 INTRODUCTION

Situation analysis is the in-depth processing, analysis and interpretation of the current rangeland and pastoral situation. This step will identify the different types of analysis that should be carried out to accurately capture the situation on the ground. It will provide tools on data analysis strategies, both spatial and non-spatial to explore the attributes and relationships of rangelands with the environment (built and physical), socio-economic dynamics, climatic influence and the various conflicts that arise. This step will also offer tools to derive meaning from the analysed data to illustrate trends, patterns, gaps and opportunities from the analysis in maps and reports.

Purpose: To undertake in-depth examination of the current situation/conditions of the county by processing, analysing, and interpreting collected data.



Activities	Tasks	Outputs
4.1 Data processing	4.1.1 Cleaning of data 4.1.2 Categorizing of data 4.1.3 Data coding	Cleaned data
4.2 Data analysis	4.2.1 Analyse land use patterns and land tenure 4.2.2 Analyse water resources, vegetation, rangeland condition, and biodiversity 4.2.3 Analyse hazards, risks and disasters 4.2.4 Analyse traditional social structure and governance 4.2.5 Analyse gender issues and dynamics 4.2.6 Demographic analysis 4.2.7 Analyse pastoral economy 4.2.8 Analyse conflict trends and hotspots	Situation analysis report

Activities	Tasks	Outputs
4.3 Data interpretation and synthesis	4.3.1 Explore interconnections among the various themes and sectors 4.3.2 Determination of trends and patterns 4.3.3 Analysis of gaps and opportunities 4.3.4 Develop a 'nil intervention' scenario	Synthesis report 'Nil intervention' scenario

4.1.1 CLEANING OF DATA

It is the process of detecting corrupt and inaccurate data.

- ✓ Assemble the data
- ✓ Verify the data to determine its adequacy, relevance and completeness.

4.1.2 CATEGORIZING OF DATA

- ✓ Sort them out
- ✓ Categorize the data according to thematic areas

4.1.3 DATA CODING

- ✓ Data is assigned unique codes for ease of analysis
- ✓ Transform data into suitable form for computer aided analysis
- ✓ Key in the data into the computer for analysis

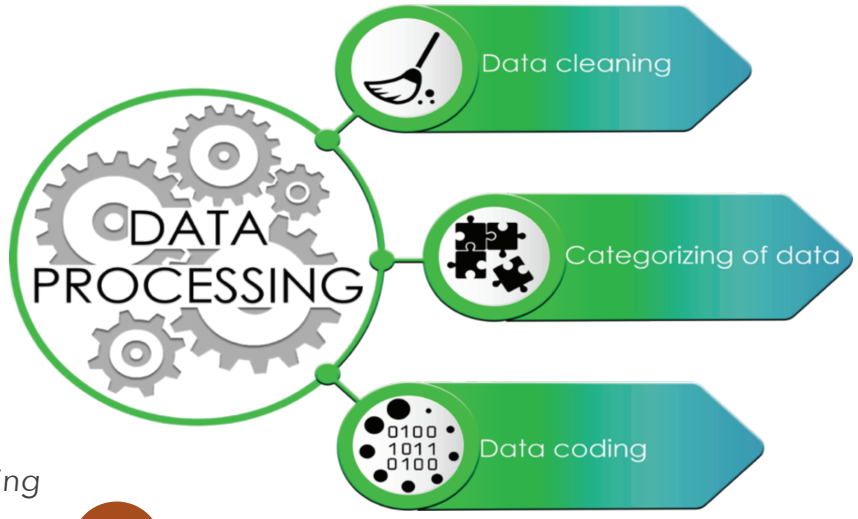


Figure 4. 1 Data Processing

TOOL 4.2-A: DATA ANALYSIS CHECKLIST

In the *Situation Analysis* step, the planning team examines and interprets the data that has been collected to come to a thorough understanding of the current situation in the county. This checklist can help the team to ensure that issues important to pastoralism and rangelands are considered in the analysis.

TYPES OF ANALYSIS

Step Four of the spatial planning process involves subjecting the information that has been collected in Step Three to:

==> Quantitative analysis
==> Qualitative analysis
==> Spatial analysis

SOME POINTS TO CONSIDER IN RANGELANDS PLANNING

- ✓ Considers cultural viewpoints and builds on local environmental knowledge.
- ✓ Addresses local conditions in both process and content.
- ✓ Takes into account traditional strategies for solving problems and conflicts.
- ✓ Requires transparency and free access to information for all participants.
- ✓ Is sensitive to gender and all stakeholder needs.
- ✓ Is flexible, responsive to findings and changing conditions.
- ✓ Is focused at improving pastoralism and securing rangelands and resources within.

ANALYSE LAND USE PATTERNS

- Identify categories of land use
- Identify changing land use patterns
- Map out the land uses
- Identify and map out rangelands
- Understand factors influencing land use patterns

ANALYSE LAND TENURE

- Identify types of land tenure
- Identify changing land tenure patterns
- Calculate percentages of ownership of land
- Define the categories and tenure regimes
- Identify the tenure threats to rangelands

ANALYSE WATER RESOURCES, VEGETATION, RANGELAND CONDITION, AND BIODIVERSITY

- Vegetation cover, rangeland condition, invasive species, and ecosystem type
- Biodiversity hotspots
- Analysis of pasture categories (rainy season, dry season, and drought pastures) in relation to vegetation and condition trends
- Grazing pressure, including trends and projections
- Projections of livestock water demand.

ANALYSE HAZARDS, RISKS AND DISASTERS

- Consider drought, wildfires, floods
- Livestock disease outbreaks
- Livestock migration patterns during droughts
- Consider areas used as drought reserves

ANALYSE TRADITIONAL SOCIAL STRUCTURE AND GOVERNANCE

- Traditional management practices
- Traditionally defined territories and land management categories
- Traditional organization and institutions
- Traditional institutions and management practices

ANALYSE GENDER ISSUES AND DYNAMICS

- Access to land among different gender
- Roles of different genders in herding, marketing, natural resource use, etc.
- Economic activities undertaken by different genders
- Population Size and structure of different gender
- Gender in terms of employment
- Access to social infrastructure like health, education and water
- Gender in relation to conflict vulnerability
- Gender dimensions in leadership, decision-making.

ANALYSE THE PASTORAL ECONOMY

- Livestock production
- Livestock mobility

- Herd composition
- Livestock-related infrastructure and services (e.g., veterinary, cattle dips, etc.)
- Livestock markets and abattoirs
- Other livelihood sources/livelihood diversification (e.g., wage labour, crop production, marketing)
- Different produce within the pastoralist and rangeland areas and their markets
- Challenges

ANALYSING CONFLICT

- Understand conflicts both spatially and temporally, including the hotspots
- Establish what approaches have been used to try to resolve the conflicts to-date,
- The impacts of the conflicts on livelihoods of the involved communities and their relationships as well as on the rangelands;
- Conflicts integration level in planning and resource management
- Timing of conflicts (during droughts, during recovery, etc.)

TOOL 4.2-B: USING RANGELAND MONITORING INFORMATION

In some Pastoral Areas, the county government or, in some cases, NGOs or community organizations, may have a system in place for long-term monitoring of rangeland condition. Review and analysis of such information, including trends in changes to rangeland condition, should inform the spatial planning process.

If no such monitoring exists, the needs of the county spatial planning process can help guide the establishment of a monitoring system. A critical first step is selection of monitoring locations and the information that is needed, defining key issues and units for monitoring. In the exercise of rangeland monitoring, start with the big picture, recognizing that there are diverse resources. There are several ways to classify land areas: such as by land use, vegetation (current or historic), soils, or climate. The most current and widely used rangeland classification system is the ecological site. An ecological site also known as "range site" is an area with similar soil and climate conditions. Repeated observations from sites around the county can provide useful information for the county spatial planning process.

Remember, monitoring units and range sites within them must always be clearly mapped and documented. In other words, use GPS, explain somewhere in your survey notes why and how you selected the sites for evaluation, and consider marking it with a T-post or other marker.

USING MONITORING INFORMATION IN THE CSP

The primary use of rangeland monitoring information in a CSP is to identify the conditions and trends in different areas of each planning unit. Even if the available monitoring information does not allow for quantifying rangeland condition, evidence-based qualitative descriptors for different areas, such as "good condition but underused", "good condition but currently being overused", and "degraded/degrading", can be very useful (see Table 4.1).

Table 4.1 : Examples of Use of Rangeland Monitoring Information to Inform CSP Interventions

RANGELAND/PASTURE CONDITION	POSSIBLE ACTIONS FOR THE CSP
Pastures in good condition, but underused	• Prioritization for careful investment to enable use (development of water points, especially seasonal rather than permanent water points). • Establishment of stock routes to improve connectivity to these pastures.
Pastures in good condition, used adequately	• Restriction on establishment of new settlements or water points.
Pastures in good condition but perhaps currently being overused (and therefore susceptible to future degradation)	• Prioritization for support to community land management committees or other community rangeland management organizations in development and enforcement of grazing plans.

RANGELAND/PASTURE CONDITION	POSSIBLE ACTIONS FOR THE CSP
Degraded/degrading pastures (including locations with concentration of bush encroachment/ invasive species)	• Prioritization for investment in land restoration.

THE KEY LIMITING FACTOR

Another use for rangeland monitoring information is to help identify the limiting factor for livestock production. It is not uncommon that any particular rangeland area will have one main factor limiting production. It may be forage or it may be water. More careful assessment can narrow this down further: forage close to permanent water in the dry season, late rainy season forage, etc. The timing and location of conflict over re-sources can sometimes be a sign of what the key limiting factor is. In some cases, particularly if there is a reasonable balance between rainy season,

HOW NOT TO USE RANGELAND MONITORING INFORMATION IN COUNTY SPATIAL PLANNING

A CSP can play a key role in some aspects of the rangeland management system of a county. However, as a ten-year plan for the whole county, it is not well suited for guiding year-to-year and day-to-day management decisions, such as decisions related to updating grazing plans, opening and closing of pasture areas, and stocking rates. This level of management decision-making is best undertaken by the land owners, whether owners of private land or communities for community land.

dry season and drought pastures, the key bottleneck may be livestock disease/ lack of access to veterinary care.

By identifying the key limiting factors for each planning unit and where they occur in space, you can help to identify what interventions to prioritize and where to target them.

RANGELAND MONITORING INFORMATION: CHECKLIST OF OUTPUTS TO INCLUDE THE SITUATION ANALYSIS REPORT

- Characterization of rangeland/pasture condition (geo-referenced) of pasture zones within each planning unit.
- Priority interventions based on this characterization.
- Identification of the key limiting factor for livestock production in each planning unit.
- Maps and GIS layers depicting the above information.

TOOL 4.3-A DATA INTERPRETATION AND SYNTHESIS CHECKLIST

Data interpretation is the process by which you evaluate and analyse your data so that it can be communicated in a meaningful way to your selected audience. The process depends on the data information generate in this case from the field through participatory mapping. This tool should be able to guide the users in interpreting and synthesising rangelands and pastoral resource information.

After analysing spatial and non-spatial conditions and characteristics in relation to different themes and sectors, the planning team and other stakeholders need to bring the different topics together, make sense of it, and develop an overarching portrait of the county.

METHODOLOGIES AND FORMS: FIGURES AND GRAPHS

Graphing data is the easiest way to visualize your data. It allows you to see potential relationships between different measurements and different data as well as helps communicate that information to your audience. Graphs can also help determine if there are any outliers in your data or which measurement could be potential errors that need to be corrected. Finally, graphs can help visualize trends in the data.

Data visualization is one key aspect of synthesis and includes proper design of graphs, figures, and tables as well as producing conceptual diagrams and infographics.

The analysis is to show changes over time on:

- → patterns
- → Factors behind the trends
- → Projections into the future
- → Statistical analysis

ANALYSIS OF GAPS AND OPPORTUNITIES

Gap analysis involves the comparison of actual performance with potential or desired performance to describe:

- → Linkages across the different themes, issues, sectors and layers
- → Emerging issues
- → Concentration/clustering of issues to be addressed

VISUAL PRESENTATION OF DATA

Appropriate visual presentation of the information that has been gathered is an essential aspect of making sense of that information. In the Situation Analysis and Synthesis reports, consider using the following:

==> Maps
==> Charts
==> Graphs
==> Tables
==> Photographs
==> Text bubbles
==> And others!

OTHER METHODS FOR EXPLORING INTERCONNECTIONS AND SYNTHESIZING

Other approaches and methods that can be used for data interpretation and synthesis include the following:

- → Spatial overlay analysis
- → Analysis of trends and projections
- → Gap analysis

SIMULATION THROUGH COMPUTER MODELLING AND ROLE PLAY GAMES

Ways of exploring the interconnections amongst the various themes, issues and sectors that have been analyzed include computer simulation modeling and simulation role-play games.

For instance, computer models can explore the implications for grazing and livestock productivity of conversion of land to other uses, or make projections about how growth in the human population and accompanying herd growth might affect the sustainability of pasture usage.

Role-play games, in which the stakeholders in the planning process become players, each representing a planner or a livestock owner, have been used to explore some of the same issues. This kind of "serious gaming" are very effective at broadening stakeholders' perspectives.

TOOL 4.3-C: THE SECOND STAKEHOLDERS MEETING(S)

While stakeholders will certainly have been involved in various ways in the research, mapping and situation analysis, it is also necessary to share the results of the situation analysis with them. Stakeholders must be given an opportunity to provide feedback on and validate the situation analysis. In the County Spatial Planning Monitoring and Oversight Guidelines, this is described as the "Second Stakeholders Meeting". To ensure meaningful and broad public participation, this will usually require a series of forums or workshops. The stakeholders meetings can be a series of such meetings. Depending on how planning areas are delineated, there may, for example, be a stakeholder meeting in each of the planning units and then one high level stakeholder's forum for the entire county.

OBJECTIVES

The objectives of the second stakeholders meeting are:

- → To present the draft situation analysis report
- → To allow stakeholders to interrogate the report
- → To identify gaps, clarify, verify details in the report and prioritize issues to be addressed
- → To build consensus on how to operationalize the vision and objectives for the Plan, in light of the situation analysis
- → To deliberate and agree on possible scenarios to consider in the next steps

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