

2

SECTION

Reconnaissance visit and transect walk

Introduction

Using the community study map, it is a good idea to conduct an initial reconnaissance visit in the study area with a few community members and the assessment team to verify features raised in the community discussion. This will help obtain a general understanding of the state of natural resources (vegetation, soil, water), what degradation types and processes are associated with which land use types (LUT) and management practices, also what are the main response measures and interventions being used. This completes the area characterization and mapping exercises (Tools 1.1 – 1.4 in Part 2 (FAO, 2011b)) and helps in selecting locations of Transect Walks (Tool 2.1) and detailed sampling sites for assessing vegetation (Tools 3.1 – 3.4), soils (Tools 4.1 – 4.4), and water resources (Tool 6.1 - 6.6). The reconnaissance visit / initial transect walk includes a rapid assessment of vegetation and soil erosion with local informants and land users (Tool 2.1). The assessment of water resources will require a specific visit to water sources in the study area and this should indicate sites where detailed assessments should be conducted (see Section 6).

The reconnaissance visit will help the team to appreciate the variation in land use, farm types, land degradation and land management measures and identify the location and number of transects. It will also identify along each transect where are possible “key” sites for detailed assessments that will provide useful comparisons of different land management practices and to learn in more detail the causes for land resources degradation, conservation (stable) or restoration (improving) and the behaviour and reasoning of the land users.



PHOTO 1 **Locating transects with land users, Tunisia**

The decision on the location and number of transects should be made with some community members, building on information collected during the community discussion and mapping exercises (Tools 1.1-1.4). One to three transects per study area are recommended to capture most of the land resources and LD / SLM features of interest in the area. They should if possible cut across the major LUTs and different land units (reflecting changes in soil and terrain) (for definitions see Table 3 in Part 1) or in the case of a very uniform landscape, cut across an area with as much variation as possible in land-user type (smallholder, large commercial farmer, herder, etc) and management practice. Some socio-economic criteria can also be used in identifying representative transect sites, such as population density.

The transect walk is not intended as a quantitative sampling tool, therefore the

number, length and width are flexible. The length of each transect walk will depend on the variation in terrain and land type but in general some 2-5 km is adequate to capture the variation in land resources and in human management / land use. In heterogeneous areas, two or three short transects may be better than a single long one to capture the variation and issues of interest in LD / SLM within the study area. The transect width is effectively the land easily visible to the naked eye as one walks. It will be narrower in areas under complex and different land-uses, or in forest, than in extensive pasture or open savannah, because of visibility and the time required to record information.

Tool 2.1 Transect walk and diagram

The objectives of the transect walk are:

1. to identify the main land use systems (1-3) and the land use types within each study area;
2. to obtain a general understanding on the ground of the landforms and resources status (vegetation, soil, water), what degradation types / processes are associated with which land use types (LUT) and which management practices, also what are the main response measures / interventions being used in the study area;
3. to identify any wider off-site and landscape effects of land use pressures (e.g. deforestation, overgrazing, burning, encroachment of wetlands, overexploitation of fragile drylands) and resulting degradation processes (e.g., water erosion, downstream impact of runoff and sediment deposition, landslides, wind erosion, dust storms, and shifting sand dunes, water or soil pollution, etc.);

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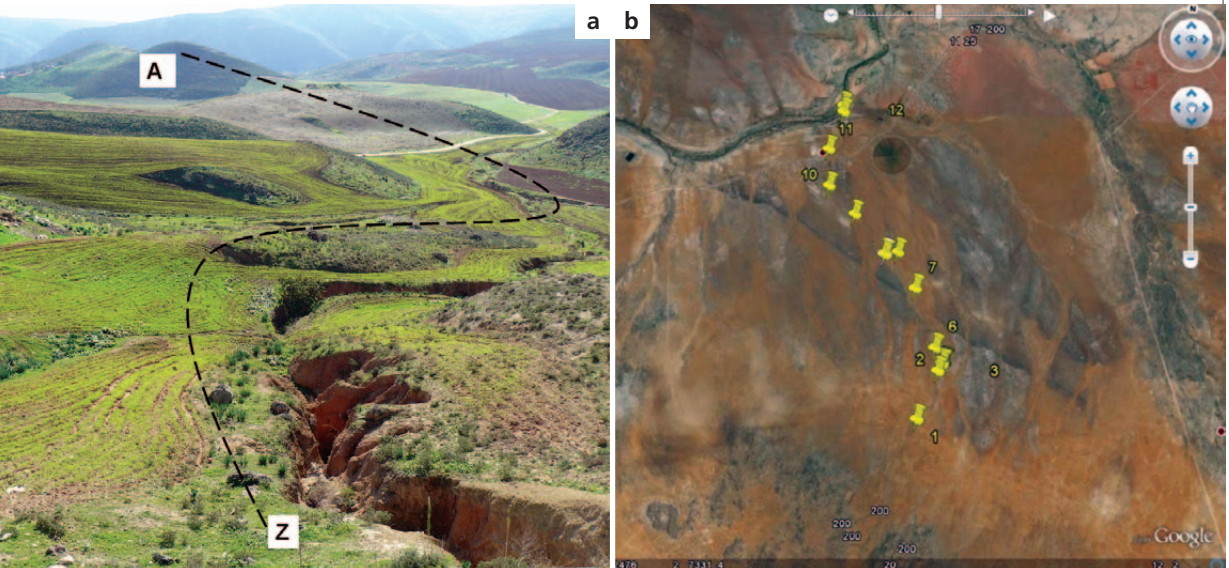


PHOTO 2 Use of a) Photographs (Béja, Tunisia) and b) Google earth images (Mankotsana, South Africa) to show the location of transects

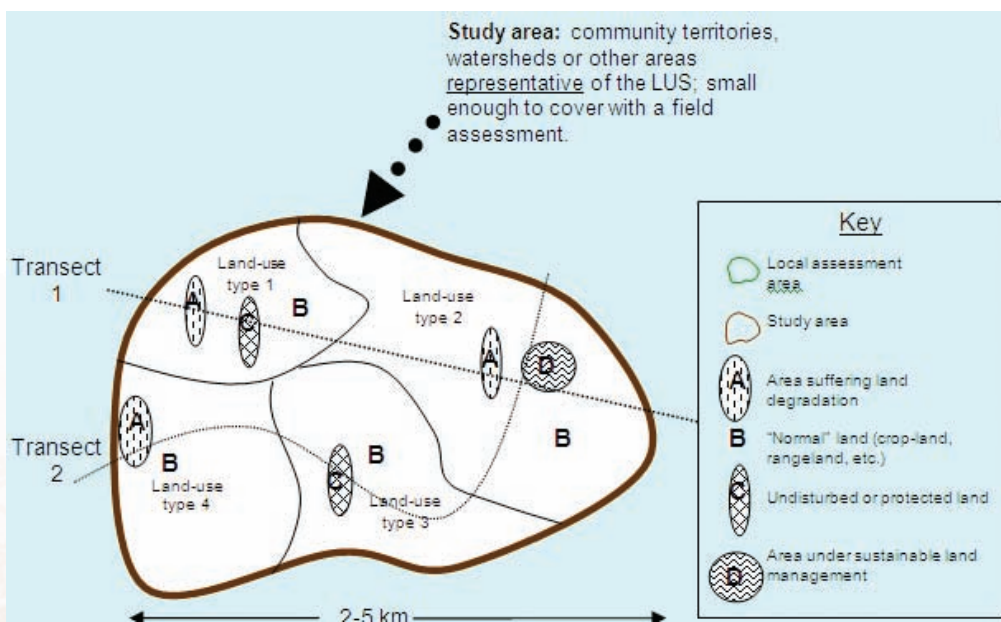


FIGURE 3 Hypothetical study area marked with two transects cutting across the main LUTs and land units and representative areas showing land degradation and SLM

4. to help locate sampling sites for the detailed vegetation and soil assessment.

Transects do not need to follow a straight line. They are used to verify features discussed in the community discussion and to identify sites for detailed assessments, they are not used as detailed quantitative sampling tools (see Figure 3).

Comparison is at the heart of the sampling strategy. Detailed assessments are conducted in areas of LD, SLM and undisturbed or protected land, then the results are compared (e.g. A, B and C are compared in land-use 1; A, B and D are compared in land-use 2 etc.). The number of comparisons possible will depend on the heterogeneity of the study area.

Expected outputs

The transect diagram, in conjunction with the study area map and photos, provides a record of the land uses and state of resources in the study area (at the given date) and contributes to the selection of the detailed assessment sites. Reasoned / systematic decision-making on where to locate detailed comparative assessments (sampling sites) is enabled by the information and understanding of the area obtained during the reconnaissance visit and transect walk. The transect information and diagram also facilitates subsequent analysis with the community of the reasons for certain land uses and management practices (i.e. direct causes as well as indirect causes or driving forces and the consequences and responses in terms of degradation and conservation / SLM – see section 7.2, Part 1 (FAO, 2011a)).

Participants

The local team should be accompanied by 2-3 local people / "informants" (selected from those involved in the community focus group discussion and study area mapping (Tools 1.1 and 1.4) and the land users encountered, both

men and women, with knowledge of land use changes, of vegetation species and uses (local names), their crop, livestock and forest management practices. It is important that the local community are supportive of the choice of informants.

Materials / preparations required:

- note-taking materials (paper and clipboard);
- maps, aerial photos and/or satellite image to locate transects, features and boundaries;
- GPS to record locations and altitude (of major changes in land use, land form, vegetation, soil) and detailed assessment sites;
- digital camera;
- compass to indicate slope aspect and location of features (or GPS can be used);
- Abney level or clinometer to take slope and tree height measurements;
- tape measure to measure distances;
- machete to cut through thickets (optional);
- a spade to check topsoil type (colour, texture) and soil impediments (hardpans, exposed rock, depth to bedrock, perched water table, etc);
- plastic bags to take any samples (vegetation, insect pests).

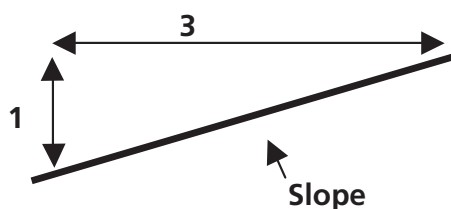
Time required

Three to four hours per transect (depending on distance, complexity, ease of access etc.).

Steps of the Transect Walk

1. Identify key informants and land users (both men and women) who are knowledgeable (especially in identifying local plant and indicator species) and willing to assist (e.g. identified with the help of community leaders and through the focus group discussion).

2. Identify the transect route with these key informants (using community and conventional maps, aerial photos, satellite images):
 - to cut across major land use types and land units (terrain, soil);
 - to capture variation in land users and management practices (including common property resources (forest or pasture lands) and protected areas (parks, reserves));
 - to capture variation in socio-economic variables (population, farm size etc.);
 - to cut across areas that are degraded / eroded and areas with productive land or where there have been major conservation / land resources management activities.
3. Discuss with the key informants and list the different factors to be drawn on the transect: land use, natural vegetation, soil, water, crop, livestock and forest management; degradation types; problems and opportunities as perceived by the community.
4. Walk along the transect route with local informants: identify on the recording form by observation and GPS coordinates, the start and end points and the actual length and width.
5. Along the transect, record altitude (m) and GPS coordinates at each main change in LUT or land unit and where the transect crosses a road, river or other infrastructure or administrative border (e.g. protected area); this helps to compare ground observations with satellite imagery (Google earth etc) and facilitates subsequent monitoring.
6. Take notes and photos as the team walks along the transect to record each distinct change in LUT, landform, land resources status, degradation features, management practices. In each LUT, discuss with land users and key informants the relationship between land degradation and the management practices. Record the range of observations / information on a sketch map and as notes as detailed in Table 1 and in the transect diagram below:
 - landform (position in the landscape), land unit (soil and terrain), land constraints;
 - land use (use LUS and LUT classes - see Table 2 in Part 1);
 - vegetation type, cover, biodiversity and signs of degradation / management;
 - main soil types and degradation features (erosion, compaction, etc.);
 - water sources (rivers, streams, springs, wetland areas, wells / bore-holes), main uses, and signs of degradation / management (as and when they occur along the transect line);
 - watershed / soil and water management / evidence of burning and use of fire management.
7. **Landforms:** For each main land unit across the transect, it is useful to characterise the landform, slope form, gradient and orientation, also the drainage density using the classes in Table 1. Record the landform and position in the landscape (see Figure 4) as this affects the hydrological conditions of the site: indicate whether there are signs of surface and subsurface runoff, drainage and if the unit is predominantly water receiving or water shedding. (FAO, 2006).



where for example:
Slope Ratio: 3:1 or 3 to 1
Percent Slope: 33%
Degree Slope: 18.4°
33 cm in 1 m

FIGURE 4 Calculating slope degree or percentage

Indicate whether the slope is level, gently sloping or steep and record the slope gradient using the Abney level or clinometer in degrees or % (be consistent). Also indicate the form of the slope (S straight; C concave; V convex; T terraced; X irregular) and whether the area

is subject to erosion or whether it is a zone of deposition. Indicate if any management practices have altered the slope (e.g. contour bunding, terracing, levelling, raised beds).

Indicate the orientation of the slope as this influences the exposure to sun and hence temperature, aridity and hence productivity. South (S) facing slopes are sunnier and warmer than north facing slopes in the northern hemisphere (conversely in the S hemisphere), while east and west facing slopes will show less variation or extremes.

8. **Hydrology and water resources:** It is also useful to describe the hydrological pattern in the study area (see Table 2) and how that affects water availability and management. During the transect walk, specific questions can be asked about changes in water availability, quality and access however the transect might not cross several water points. Since the water resources are distributed across the whole study area, it will require

TABLE 1 Hierarchy of main landforms and slopes (source: FAO, 2006)

Landform	Slope	%	Degree
Level land (L)		<1	
<ul style="list-style-type: none"> • Plain (LP) • Plateau (LL) • Depression (LD) • Valley floor (LV) 	1. Level 2. Nearly level	0 – 1	<0.6
Sloping land (S)		1 – 15	
<ul style="list-style-type: none"> • Escarpment zone (SE) • Hill (SH) • Mountain (SM) • Dissected plain (SP) • Valley (SV) 	3. Very gently sloping 4. Gently sloping 5. Sloping 6. Strongly sloping	1 – 2 2 – 5 5 – 10 10 – 15	0.6 – 1.1 1.1 – 2.9 2.9 – 5.7 5.7 – 8.5
Steep land (T)		10>	
<ul style="list-style-type: none"> • Escarpment zone (TE) • Hill (TH) • Mountain (TM) • Valley (TV) 	6. Strongly sloping 7. Moderately steep 8. Steep 9. Very steep	10 – 15 15 – 30 30 – 45 > 45	5.7 – 8.5 8.5 – 16.5 16.5 – 24 24 >

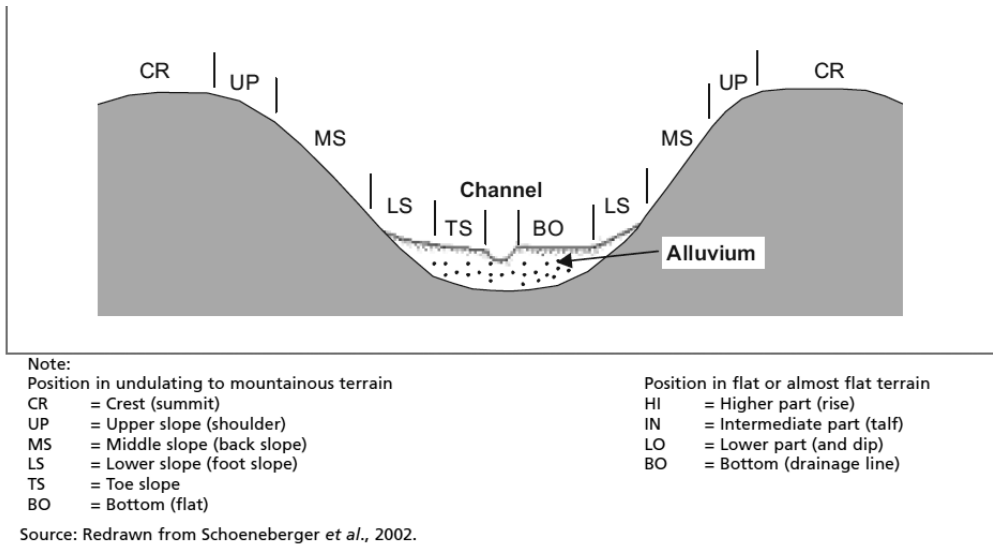


FIGURE 5 Slope positions in undulating and mountainous terrain

a specific visit by team members with some community members / key informants to selected natural and manmade water

points and key hydrological features (e.g. wetlands, rivers) backed-up by the FGD with community members (Tool 1.1) and

TABLE 2 Hydrological patterns

	Hydrology	Water availability	Water management
No evident water courses	Very dry, flat areas; sandy well drained soils; little or no surface flow	Wells and boreholes to access groundwater	Harvesting of runoff from compacted area Aquifer recharge
Sparsely spaced watercourses	Few widely spaced, slow flowing water courses in flat or undulating topography	Few, natural water points may be supplemented by wells and boreholes	Flood control Wetland management Water pumped for irrigation
Moderate, incised	Many closely spaced water courses in hilly lands with fast flow in rainy seasons	Many rivers and streams and springs	Soil and water conservation to reduce runoff Dams for water regulation and storage
Densely spaced watercourses	Many closely spaced (branching) water courses in steep or dissected landscapes	Many rivers and streams fed by upstream catchments (rain or snowmelt)	Soil and water conservation to reduce runoff Dams for water regulation and storage

key informant interview (Tool 6.1) to assess the status and trends of water resources (see chapter 6 in this document).

9. **Vegetation:** This reconnaissance / initial transect walk should enable the team to obtain an overview of relationships between land use / vegetation and degradation (type and severity), conservation or sustainable management practice across the different land units. Where possible, for each land use, comparisons should be made with a benchmark site that is protected or under good management and with little evidence of degradation. The main vegetation indicators that reflect degradation or improvement are:
 - **Vegetation cover** which protects soil from degradation by sun, wind and water erosion (good, medium, poor);
 - **Vegetation structure and species composition** which determines cover, shade, use, productivity, key vegetation types. Change in dominant species is a key indicator of degradation and is readily seen by comparing the situation with a well managed/protected site (benchmark). The share or ratio of beneficial/economically valuable species to harmful / unpalatable / invasive species is also important as this influences livelihoods;
 - **Habitat, species and genetic diversity:** (high, medium, low) may be assessed in terms of occurrence and connectedness of varied habitats which is important for beneficial species such as pollinators, predators and other wildlife species that provide food, fuel, other products for human use. Homogeneous farming or mono-cultures often face increased pest and disease incidence compared to farms with diverse crops (rotations, intercropping) and field borders (hedges, windbreaks etc.);
 - **Specific indicator species:** Land users will be able to indicate reduction or loss of useful species and products and to identify **Indicator plants** that reflect constraints to use such as salinity, waterlogging, poor soil fertility, fire incidence, or good land condition (fertile soil; etc.);
 - **Vegetation health and productivity** includes quality/extent of damage (by fire, pests, overexploitation, etc.) and regeneration capacity (poor, moderate, good) i.e. numbers of dead plants compared to seedlings/extent of re-growth;
 - **Management:** the intensity of use, the management practices and uses of products.
10. **Soil Erosion:** During the reconnaissance visit / transect walk, the team can conduct a rapid qualitative estimate of the relationship between the land management practices and the type of soil erosion, its state (i.e. whether it is active, partly stabilised or stable), also its extent and severity for each LUT designated on the community map of the study area (or land units identified through other maps, aerial photos or satellite images). The types or processes and visual indicators of wind and water erosion include:
 - **Soil erosion by wind:** the removal and the deposition of soil particles by wind action and the abrasive effects of moving particles as they are transported. The visible features are described in Table 3 below and Annex 1 and include:
 - **Signs of the movement /transport of soil particles** by wind.
 - **Wind scouring** signs (depressions, soil horizons exposed; plant roots exposed).
 - **Deposits of wind-blown soil** where the wind is obstructed.

- **Mobile sand dunes** that may encroach on farm land, pastures, settlements, roads.
- **Soil erosion by water:** the transport and deposition down slope of soil particles through a number of processes, the visible signs are summarised in Table 5 below and Annex 1:
 - **Splash erosion** – where raindrop impacts displace soil particles vertically and down slope and may create a compacted surface crust that inhibits plant establishment.
 - **Sheet erosion** – by surface runoff that picks up and transports soil particles dislodged by raindrop impact. It is a gradual, uniform process and difficult to detect until it develops into rill erosion.
 - **Rill erosion** – by the scouring action of water as it runs down slope during rainfall creating shallow linear channels in the soil surface less than 30 cm deep. Rills can be completely smoothed out by cultivation with animal or machine drawn implements (though traces may remain with hand cultivation).
 - **Gully erosion** – develops where drainage is concentrated, creating a channel or ravine over 30 cm deep that may reach several metres deep and wide. Gullies are prevalent on deep loamy to clayey soils, unstable clays (e.g. sodic soils) and on steep slopes subject to seepage of water and landslides. Gullies form a physical impediment to cultivation and cross-

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PHOTO 3 Gully erosion towards Niakha wetland (Senegal)

slope movement of people and farm implements. They require specific interventions for stabilisation or rehabilitation

- **Mass Movement** is the relatively large down-slope movement of soil and / or rock (landslides, slumps, earth flows and debris avalanches) that may be caused by water or by earthquakes.

During the walk, indicate the erosion feature and use the visual indicators in Tables 3, 4 and 5 to assess its state (active, partly stabilised, stable) and severity (low, moderate, severe). Relate these observations to the vegetation assessment that has just been made and take into account the time of year / seasonality. The risk of wind erosion is highest prior to the onset of the rains (e.g. due to strong winds, dry topsoil, poor vegetative cover, lack of windbreaks). The risk of water erosion is highest at the onset of the rains when the soil is bare or poorly covered.

11. Land Management: During the transect walk the team should identify specific issues that need to be further investigated during the detailed site assessments (i.e. possible land use management and degradation relationships) and should locate suitable assessment sites that facilitate comparisons (i.e. between well and poorly managed crop, pasture, or forest land). To facilitate selection of sites for the detailed assessment the digging of many, rapid, “one spadeful” holes is encouraged to provide a rapid overview of soil types, human management impacts, soil-vegetation relationships. Discuss, reach agreement and record the altitude (m) and GPS coordinates of selected sampling sites so that they can be recorded on the transect diagram. During the detailed site investigations over the following day(s), more in depth and time consuming vegetation sampling (using quadrats and collecting specimens for identification) and soil sampling (soil properties and soil erosion measurements) are undertaken as described in the vegetation and soil sections of this manual.

TABLE 3 Indicators of the state of erosion by wind, water and mass movement

	State of Wind, Splash, Sheet, Rill and Gully Erosion	State of Mass Movement
<i>Active Erosion</i>	One or more of the following conditions apply: <ul style="list-style-type: none"> • evidence of recent sediment movement; • sides and / or floors of rills & gullies are relatively bare of vegetation; • sand dunes have little vegetative cover, with signs of scouring on the windward side and deposition on the leeward side 	Landslide scars clearly visible with sharp boundaries and less than 10% vegetation cover within the landslide area.
<i>Partly Stabilised</i>	Localised evidence of active water and / or wind erosion; but part of the eroded area shows evidence of stabilisation and partial re-vegetation.	Landslide scars clearly visible; vegetation cover 10-50% of the landslide area
<i>Stable</i>	One or more of the following conditions apply: <ul style="list-style-type: none"> • no evidence of recent sediment movement; • sides and / or floors of rills and gullies are re-vegetated • sand dunes well vegetated with few bare areas from which soil could be removed by wind. 	Landslide scars still detectable but no longer with sharp boundaries and with greater than 50% vegetation cover within the land slide area.

TABLE 4 Indicators of the severity of wind erosion

Severity	Wind erosion
<i>None</i>	No obvious visual signs of wind erosion (but minor evidence may have been masked by e.g. recent tillage)
<i>Slight</i>	<ul style="list-style-type: none"> • Some signs of soil particle transport by wind • A few superficial roots exposed by wind scour. • Deposits of wind blown soil < 2 cm thick where wind has been obstructed. • A little wind blown soil accumulated in ditches. • A light cover of wind blown material on roads
<i>Moderate</i>	<ul style="list-style-type: none"> • Clear signs of transport and deposition of soil particles by wind • Some scouring but < 5 cm in depth. • Some tree, shrub, grass and/or crop roots exposed within the topsoil • Deposits of wind blown soil 2 to 5 cm thick where wind has been obstructed. • Moderate accumulation of wind blown soil in ditches. • Moderate cover of wind blown soil on roads/ settlement
<i>Severe</i>	<ul style="list-style-type: none"> • Clear signs of whole sale transport and deposition of soil particles by wind. • Extensive scouring > 5 cm in depth • Extensive exposure of tree, shrub, grass or crop roots. • Exposed subsoil horizons at or close to the soil surface. • Drainage ditches filled with wind blown soil. • Original soil surface buried under at least 5 cm of wind blown soil • Wind blown material accumulating deeply on roads/ settlements with negative impact on transport and living conditions.

12. **Land users behaviour:** Local informants and land users can be prompted during the transect walk to provide information to cross check information from the community FGD. Questions should be flexible and relevant to the field observations, helping the team to understand the reasons why land users do or do not invest to maintain land productivity and ecosystem services. To the extent possible, land user interviews will be conducted in the field during the vegetation, soil and water resources detailed assessments.

13. During the transect walk the team should identify and request some of the specific land users to be available for the detailed site assessments and for more detailed semi-structured interviews. In case of absence of key land users, the team should ascertain if they could be contacted another day. Issues

raised may need to be followed up with officials from land and forestry offices and through specific questions with land users during the detailed site assessments.

14. **Transect diagram:** A rough transect diagram should be drawn and, if possible, cross-checked with key informants immediately after the walk to verify it is a good representation. Then return to the field team's "office" and complete the transect diagram, or matrix, with details including the detailed assessment sites, as shown in Figure 6. Table 6 summarises the information that can be shown on the transect diagram

TABLE 5 Indicators of the severity of soil erosion by water and mass movement

State and severity	Splash erosion	Sheet erosion	Rill erosion	Gully and ravine erosion	Mass movement	Stream / river bank erosion
None (or not apparent)	No obvious visual signs of splash erosion (indicate if this may be masked by recent tillage).	No visual indicators of sheet erosion (indicate if this may be masked e.g. by recent tillage).	No rills present.	No gullies present	No sign of slumps / slides	<ul style="list-style-type: none"> Stream bank has close to 100% vegetative cover, no active erosion Little if any signs of undercutting on outer bends of meanders and little active deposition of sediment on the inside.
Low	<ul style="list-style-type: none"> Some visible splash of soil particles onto plant stems / under-sides of leaves. Signs of surface sealing due to rain drop impact Any surface crust is thin and weak. 	<ul style="list-style-type: none"> Some visual evidence of the movement of topsoil particles down slope through surface wash No evidence of pedestal development. Only a few exposed superficial roots. 	A few shallow (< 0.1m depth) rills affecting no more than 5% of the surface area.	A few shallow (<0.5m depth) gullies affecting no more than 5% of the surface	Isolated land slump/ slide events, small in size or affecting less than 0.1% of the total area.	<ul style="list-style-type: none"> Limited loss of vegetative cover (>80% cover) and only slight erosion on mid to upper portion of the stream bank. <5% of outer bends of meanders over a 1km stretch show active undercutting of only the lower portion of the bank and some deposition on the inside.

TABLE 5 Indicators of the severity of soil erosion by water and mass movement (continued)

State and severity	Splash erosion	Sheet erosion	Rill erosion	Gully and ravine erosion	Mass movement	Stream / river bank erosion
Moderate	<ul style="list-style-type: none"> Clear signs of splash of soil particles into the air - moderate soil coating on stems / undersides of leaves Clear sign of surface sealing by raindrop impact Surface crust < 1 cm thick; readily broken 	<ul style="list-style-type: none"> Clear signs of down slope transport and deposition of topsoil by surface wash. Some pedestals but < 5 cm. in height. Some tree, grass, crop roots exposed in topsoil. Evidence of topsoil loss but no exposed subsoil 	Presence of shallow to moderately deep rills (<0.2m depth) and/or rills affecting up to 25% of the surface area.	Presence of shallow to moderately deep gullies (0.5-1.0 m depth) and/or gullies affecting 5 - 25% of the surface area.	A moderate number of individual slumps/slide, events- small to moderate in size and/ or affecting up to 1% total area.	<ul style="list-style-type: none"> Moderate loss of vegetative cover (50-80% remaining) and slight to moderate erosion on the mid to upper portion of the stream bank. 5-15% of the outer bends of meanders over a 1km stretch show active undercutting that may extend into the mid portion of the bank and moderate deposition of sediment on the inside.
Severe	<ul style="list-style-type: none"> Clear generalised splash of soil particles - presence of soil on stems and leaves. Clear surface sealing by raindrop impact Hard surface crust > 1 cm thick. 	<ul style="list-style-type: none"> Clear evidence of whole sale downslope transport and deposition of topsoil particles by surface wash. Pedestals > 5 cm high Extensive exposure of tree, grass, crop roots Subsoil horizons exposed at /near soil surface. 	Presence of deep rills (up to 0.3m depth) and / or rills affecting more than 25% of the surface area.	Presence of deep gullies (>1m depth) and/ or affecting > 25% of the surface	Significant number of slump / slide events, may be large and/ or affecting > 1% of total area.	<ul style="list-style-type: none"> Severe loss of vegetative cover (<50% cover) and moderate to severe erosion on mid to upper portion of the stream bank. >15% of outer bends of meanders over a 1km stretch with active under-cutting at upper part of the bank and heavy deposition on inside.

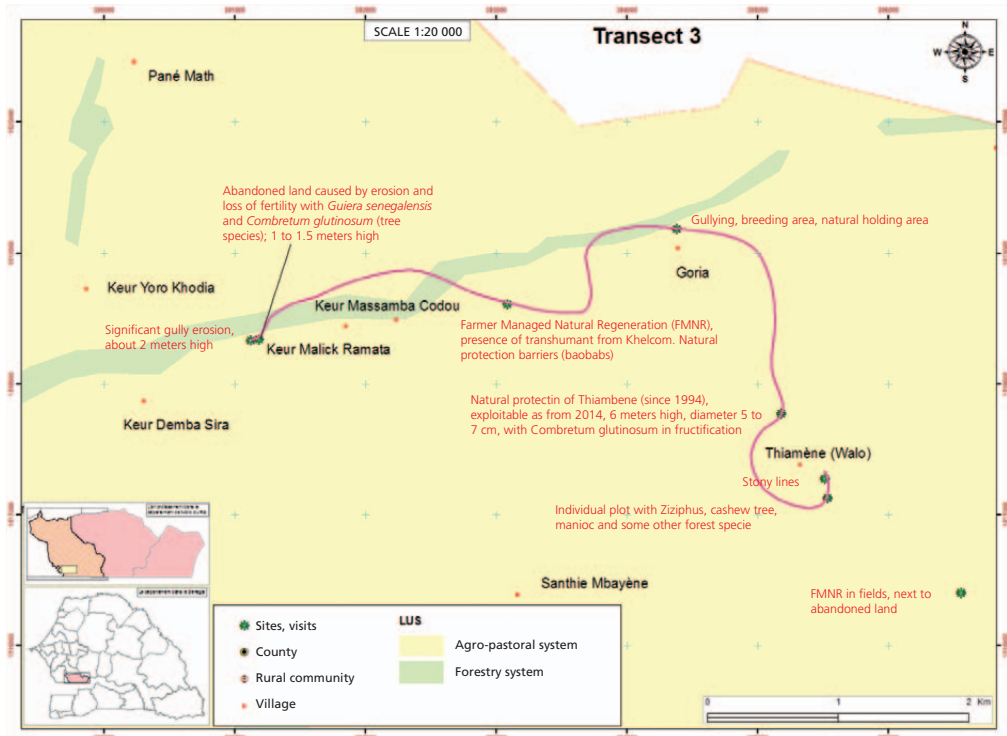


FIGURE 6 Image showing a transect walk cutting across two land use types and indicating detailed assessment sites in Senegal

TABLE 6 Summary of the information to record on land use, resources, degradation types and management practices along transects

Theme / Issue	Indicators of land uses, resources, degradation and management
Natural resources status and trends	
Land use	<ul style="list-style-type: none"> Land use system (LUS) – if available - and land use type (LUT) Land use intensity: density of homesteads / farms, farm size, fragmentation, individual to communal lands etc.)
Land unit / soil and terrain <ul style="list-style-type: none"> ask what terms / criteria locals use to distinguish land units take care not to mix degrees ° and % slope 	<ul style="list-style-type: none"> Land form (plateau, summit, mountain/hill slope, foothill / filtration zone, valley, river terrace etc.) Average slope (% or degree; steep, moderate, gentle, flat) Aspect / direction of the slope (compass bearing e.g. N facing) Soil fertility (good, medium, poor) Soil texture (sandy – loamy- clayey) and colour (dark or light; red-yellow-brown-black reflects minerals and organic matter);
Land constraints indicate main constraints for human use	<ul style="list-style-type: none"> Steep / unstable slopes Extent of rock outcrops, shallow soils Surface hardness (crusts; laterite), stoniness /l arge clods Salinity- whitish salt deposits Surface waterlogging / ponding Exposed to strong / dry winds / dust storms
Main land degradation features	<ul style="list-style-type: none"> Presence of sheet erosion, rills and gullies (slight, moderate, severe), and state (active, partly stabilised, stable) Sediment deposits from wind or water erosion Land slumping or landslides River / stream bank erosion Degraded vegetation (bush encroachment / deforestation / overgrazing burning- extent (h, m, l) and severity (h, m, l)
Vegetation cover, type, diversity and degradation signs	<ul style="list-style-type: none"> Cover quality: living plants and residues /litter (low, medium, high) ; % ground and % canopy cover Type and structure (% grasses / other herbaceous spp. (perennial / annual), shrubs, trees)- planted or natural Species: dominant species; share of i) beneficial / economically valuable species and ii) harmful / unpalatable / invasive species; Plant health: extent / area of disease / pest / fire damage (h, m, l, n) and age structure (number of dead plants / seedlings / re-growth Indicator plants (salinity, waterlogging, infertile soils, fire resistant) Habitat diversity: fragmentation / connectedness; occurrence of trees, woods, field borders, live fences, fallow land etc.) Evidence of wildlife (pigs, rabbits, rodents, snakes, birds etc.)

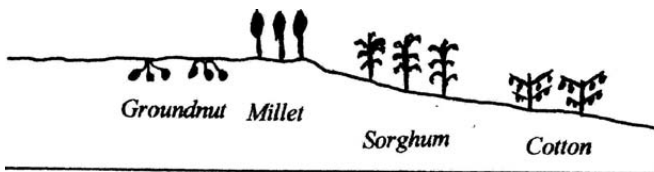
TABLE 6 Summary of the information to record on land use, resources, degradation types and management practices along transects (*continued*)

Theme / Issue	Indicators of land uses, resources, degradation and management
Water sources, availability, quality, use and degradation signs	<ul style="list-style-type: none"> • Drainage pattern (dense, medium, light) • Water source: river, stream spring (perennial / ephemeral) • Wetland condition (protected, stable, degraded); % converted (e.g. drained and cropped) • Water point: well, borehole, piped water, dam / pond, (perennial, seasonal, abandoned) • Water quality: turbidity / sediment load (dark, light, clear) ; evidence of pollutants (smell, visible signs, aquatic weeds) • Water availability (g, m, p), trend (increase, stable, decrease) and uses (household, livestock, irrigation, other) • Access (distance / time in dry and wet season) ; public / private
Ecosystem integrity in selected catchment / landscape	<ul style="list-style-type: none"> • Wider landscape value (aesthetic, tourism, etc.) • Threats / risks to sustained resources, ecosystems and productivity (urban /settlement expansion, encroachment of agriculture, charcoal production, commodity specialisation, etc.) • Resilience / opportunities for sustaining resources, ecosystems, productivity, diversity)
Management practices/systems and their effects	
Watershed / soil and water management/ water storage / harvesting / irrigation	<ul style="list-style-type: none"> • Type and % area under protection measures (e.g. protected, afforestation, protection of water sources, gully reclamation, dune stabilisation, etc.) • Improved farming / soil and water conservation practices (e.g. contour farming, tied ridges, vegetation strips, stone lines, bunds, terraces, zai) • Management and use of water storage structure (catchment of dam, pond, tank; controlled access livestock and grazing; troughs / pumping for irrigation) • Type and source of contamination (domestic / livestock waste, agricultural or industrial pollutants) • Water harvesting (type, extent, purpose) • Irrigation type (sprinkler; furrow; drip; flood; border), water source, surface area, crop; use of waste water
Forestry system management	<ul style="list-style-type: none"> • Primary / secondary forest - main species; loss of useful species • Planted / managed forest - main species, loss of useful species • Forest health (g, m, p); quality (clearings, damage) and age structure (mortality/regrowth) • Management practice (coppicing, firebreaks etc) • Biomass (density, height and diameter of trees / shrubs- carbon content) and productivity (timber, firewood, other products) • Degradation causes / trends: deforestation, overexploitation, burning, conversion to other uses (slight, moderate, severe)

TABLE 6 Summary of the information to record on land use, resources, degradation types and management practices along transects (*continued*)

Theme / Issue	Indicators of land uses, resources, degradation and management
Grazing system (range / pasture) management	<ul style="list-style-type: none"> • Livestock types, herd size and composition (age, sex) • Extensive / intensive grazing (% area) • Livestock management / feeding (free grazing, fenced, tethered, stall-fed, cut and carry, improved pastures; seasonal movements; grazing corridors, pest /disease management) • Pasture health (g, m, p) and composition (% shrub / herbaceous species); indicator species, palatable/undesirable species- thorny, poisonous, salt tolerant etc); • Plant biomass (height and density) and productivity / livestock carrying capacity (from secondary information – see section 5.2 in Part 1 (FAO, 2011a)) • Degradation causes / trends: overgrazing, burning, conversion to other uses (slight, moderate, severe)
Cropping and mixed systems management (agroforestry, agropastoral; agrosilvopastoral)	<ul style="list-style-type: none"> • Crop types and diversity (annual / perennial species / varieties, mixes) • Previous land use / crop rotation (1-4 years) • Crop management practices: use of residues / mulch, organic matter, weeding, • Agropastoral practices (use of manure for crops, of crop residues for feed / fuel) and livestock type(s) and management • Agroforestry practices- tree species (indigenous / introduced), % area (e.g. alley cropping, contour planting, scattered) • Tillage mode (% hand, oxen, tractor) ; % cultivated area under conservation agriculture (zero tillage, permanent cover) • Fallow natural / improved % of land (fallow / cultivated), • Recent losses of important crop species, varieties and uses, also of useful associated species (pollinators, predators of pests) • Productivity (forage crops, grain, straw, tubers, fruits, other) • Degradation causes / trends: nutrient mining, monocultures, inappropriate use of chemicals, poor cover / organic matter management.

FIGURE 7 Example of a transect diagram including information on land use, degradation type, extent and control measures

Description of land resources, degradation and management for each land use type along the transect walk		
LUS: Example: Annual cropping	Annual crops, grazing mix	Annual crop land, grazing mix, trees
Record where the transect crosses a road, river or other infrastructure or border (e.g. protected area)		
GPS location (from start to end)	XXX – YYY	XXX – YYY
Altitude range (from start to end)	XXX – YYY	XXX – YYY
Average slope (in degree or %)	XX	XX
Land / soil resources <ul style="list-style-type: none"> • soil texture • soil colour • soil fertility (G, M, P) 	<ul style="list-style-type: none"> • Gravel, sand • Red • medium/shallow 	<ul style="list-style-type: none"> • Sand, loamy-sand • Red to brown • poor
Water sources / hydrology	<ul style="list-style-type: none"> • none 	<ul style="list-style-type: none"> • none
Major constraints to use	<ul style="list-style-type: none"> • Low moisture • shallow soil, exposed rocks 	<ul style="list-style-type: none"> • Erosion risk
Natural vegetation <ul style="list-style-type: none"> • type and cover • main species • indicator species 	Poor cover, few trees <ul style="list-style-type: none"> • <i>Combretum</i> sp., <i>Burkea africana</i> • 	Negligible ground cover <ul style="list-style-type: none"> • <i>Vitellaria paradoxa</i>, small <i>Parkia biglobosa</i> •
Major crops, livestock and/or planted tree species	Millet, groundnut Small ruminants tethered at homestead	Sorghum, millet, cotton, groundnut
Land degradation features – soil, water and vegetation (specify also extent and severity)	Drought prone Deforestation	Soil erosion – rills/gullies Active- severe
Land management / soil and water conservation / restoration measures (specify extent and effects)	Mulching on some fields	Contour tillage demo. Planted grass strips / trees in some fields –less erosion
Land use intensity (farm/field sizes; fragmentation, borders etc.)	<ul style="list-style-type: none"> • larger farms • trees and shrubs in borders 	<ul style="list-style-type: none"> • small field and farms

**Description of land resources, degradation and management
for each land use type along the transect walk**

LUS:

Annual crops, grazing mix

Annual crops

Example: Annual cropping



GPS location (from start to end)	XXX - YYY	XXX - YYY
Altitude range (from start to end)	XXX - YYY	XXX - YYY
Average slope (in degree or %)	XX	XX
Land / soil resources <ul style="list-style-type: none"> • soil texture • soil colour • soil fertility (G, M, P) 	<ul style="list-style-type: none"> • Sandy loam to loam • Brown to black • good 	<ul style="list-style-type: none"> • Clay • Black • good
Water sources / hydrology	<ul style="list-style-type: none"> • 1 well and 1 borehole in the village 	<ul style="list-style-type: none"> • Small river (dries up in some dry seasons)
Major constraints to use	<ul style="list-style-type: none"> • Soil sticky; land difficult to prepare • Drying 	<ul style="list-style-type: none"> • Water logging • Land difficult to prepare
Natural vegetation <ul style="list-style-type: none"> • type and cover • main species • indicator species 	Healthier vegetation <ul style="list-style-type: none"> • Large <i>Parkia biglobosa</i>, and <i>Vitellaria paradoxa</i>, <i>Daniellia oliveri</i> 	Hydrophilous plants: <ul style="list-style-type: none"> • <i>Terminalia macroptera</i> • <i>Mitragyna inermis</i>
Major crops, livestock and/or planted tree species	Maize, sorghum, some cotton	<ul style="list-style-type: none"> • Rice, vegetables • Small herd of cattle
Land degradation features – soil, water and vegetation (specify also extent and severity)	Soil erosion – rill/sheet Active-slight	<ul style="list-style-type: none"> • Waterlogging, • water pollution, • sedimentation
Land management / soil and water conservation / restoration measures (specify extent and effects)	None	None
Land use intensity (farm/field sizes; fragmentation, borders etc.)	<ul style="list-style-type: none"> • small fields and farms 	<ul style="list-style-type: none"> • very small fields

