LAND MANAGEMENT, ENVIRONMENT & SOLID-WASTE: INSIDE EDUCATION AND BUSINESS IN CENTRAL ASIA
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MICRO-CREDENTIAL

LAND MANAGEMENT IN CENTRAL ASIA

10.- Introduction to Remote Sensing

Activity

Identify remote sensing applications in land management

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Activity Sheet

Identify Remote Sensing Applications in Land Management

Module	Introduction to Remote Sensing	**Level**	Bachelor students
Suggested duration	60-75 minutes	**Format**	Individual work + pair/group discussion

Purpose

This activity helps students connect the main ideas from the introductory remote sensing lessons to practical land management tasks. Students identify where remote sensing is useful, what kind of data may be needed, what outputs can be produced, and what limitations should be considered before using the results in planning or decision-making.

Learning outcomes

- Explain how remote sensing supports land management decisions.
- Match land-related problems with suitable remote sensing applications.
- Suggest an appropriate platform, sensor type, or data product for a given task.
- Recognize both the advantages and the practical limitations of remote sensing.

Part 1. Quick concept recall (10 minutes)

Question	Student response
In one sentence, what is remote sensing?	
Name two types of platforms.	
What is the difference between passive and active sensing?	
Which type of resolution is most important for observing change over time? Why?	

Part 2. Application matching task (25-30 minutes)

Read each land management situation and complete the table. Your answer should show the land issue, a useful remote sensing application, the type of data that could support the task, the expected output, and one practical limitation.

Land management situation	Possible remote sensing application	Useful data / platform / sensor	Expected output	Limitation or caution
Monitoring crop condition in irrigated fields				
Detecting land use / land cover change near settlements				
Identifying soil salinity or land degradation risk				
Checking waterlogging in low-lying agricultural land				
Mapping erosion-prone slopes or bare land				
Observing urban expansion onto agricultural land				
Updating land inventory information for planning				
Tracking seasonal change in vegetation or pasture condition				

Tip for students: Do not focus only on satellites. Consider ground, drone, airborne, and satellite data when the management task requires different scales or detail.

Part 3. Mini case design (15-20 minutes)

Choose one real or realistic land management problem from your region, district, river basin, or farm landscape. Then design a simple remote sensing use case.

Case title	
Location or land context	
Main management problem	
How remote sensing could help	
Data needed	
Final product for decision-makers	

Discussion prompts

- Which applications are best for monitoring change through time?
- Which applications require high spatial detail, and which can work with moderate-resolution imagery?
- What errors may appear if images are taken on different dates, in different seasons, or under cloud cover?
- How can remote sensing support land managers without fully replacing field observation?

Suggested student output

Each pair or group prepares a short summary with: (1) one completed application table row explained in full, and (2) one mini case design from Part 3. Students may present their results orally in 2-3 minutes.

Assessment Rubric

Criterion	Excellent	Good	Basic	Needs support
Understanding of the land problem	Clearly identifies the management problem and its context	Mostly clear and relevant	General but incomplete	Unclear or off-topic
Choice of remote sensing application	Strong match between problem and application	Reasonable match	Partly matched	Weak or incorrect match
Use of data concepts	Appropriate mention of platform, data type, or resolution	Mostly appropriate	Limited use of data concepts	Very limited or incorrect
Awareness of limits	Recognizes realistic constraints and cautions	Identifies at least one valid limit	Mentions a limit vaguely	No meaningful limitation given
Communication	Clear, organized, and easy to follow	Mostly clear	Some confusion	Difficult to follow

Instructor Support: Example Answer Directions

The examples below are not the only correct answers. They are intended to guide discussion and show how remote sensing concepts can be linked to land management practice.

- **Crop condition in irrigated fields:** Vegetation monitoring, crop stress mapping, irrigation performance review, often supported by multispectral imagery and repeat observations.
- **Land use / land cover change:** Change detection between dates, classification of built-up land, cropland, fallow land, water, or vegetation.
- **Soil salinity or degradation:** Surface pattern observation, indirect detection using vegetation response, bare-soil reflectance, and field verification.
- **Waterlogging:** Moisture-related mapping, repeated observation after irrigation or rainfall, and comparison across low-lying plots.
- **Erosion-prone land:** Combination of terrain information, bare-land detection, slope analysis, and vegetation cover interpretation.
- **Urban expansion:** Monitoring conversion of agricultural land to construction land and identifying growth direction over time.
- **Land inventory support:** Updating boundaries, land cover descriptions, and visible physical features for planning or management review.
- **Pasture or seasonal vegetation change:** Time-series analysis to compare seasonal productivity, stress periods, or recovery patterns.

Teaching note: Encourage students to justify why a chosen application is suitable. The best answers usually connect the management objective, the scale of observation, the type of data, and the need for field validation.