WHY DOES SOIL QUALITY MATTER IN PEOPLE IN NEED AND HOW TO GO ABOUT IT?

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WHY DOES SOIL QUALITY MATTER?

Soils are the cornerstone natural resource in the world

A healthy soil is a living, dynamic ecosystem, teeming with microscopic and larger organisms that perform many vital functions including converting dead and decaying matter as well as minerals to plant nutrients (nutrient cycling); controlling plant disease, insect and weed pests; improving soil structure with positive effects for soil water and nutrient holding capacity, and ultimately improving crop production. A healthy soil also contributes to mitigating climate change by maintaining or increasing its carbon content.

Our soils are the basis for agriculture and the medium in which nearly all food-producing plants grow. Healthy soils produce healthy crops that in turn nourish people and animals. Indeed, soil quality is directly linked to food quality and quantity.

Extracted from FAO 2015.

1. WHY DOES SOIL QUALITY MATTER IN SUSTAINABLE LIVELIHOODS AND THE ENVIRONMENTAL STRATEGY OF PIN?

PIN GOAL 1:
SUSTAINABLY INCREASE THE FOOD SECURITY AND INCOME OF POOR FARMING FAMILIES

Good soil quality is essential for the environmental and economic sustainability of agricultural activities. A decline in soil quality has a significant impact on plant growth, grain quality, yields, production costs and the increased risk of soil erosion.

PIN GOAL 2:
PROTECT PEOPLE'S LIVELIHOODS BY REDUCING THE ENVIRONMENTAL DEGRADATION AND DEPLETION OF NATURAL RESOURCES

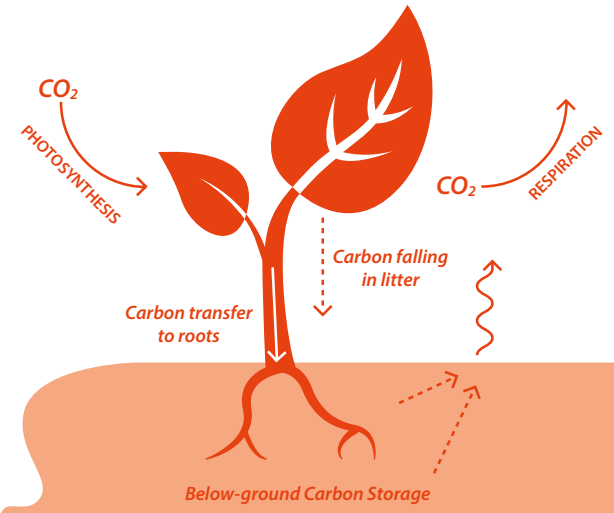
Soils with good structural properties are better adapted to extreme weather. Such soils are thus less prone to water and wind erosion, flooding and water logging. Moreover, they are able to retain water and thus keep it longer available for plants. This helps to protect livelihoods against the adverse effects of climate change.

IS YOUR PROGRAM "SOIL-SENSITIVE"?

- → Is soil quality mentioned in your project design?
- → Do the promoted practices improve the soil in farmers´ fields?
- → Do you know whether your project increases soil organic matter?
- → Do you know if the distributed fertilisers improved beneficiaries yields?
- → Does your team know the soil conditions before starting project activities?
- → Are you sure your program is climate-smart?

IF NOT YOU SHOULD:

1. **Train your team in soil ecology and soil quality assessment**
   Increased understanding of the soil ecosystem and ways to assess soil quality among the country staff as well as beneficiaries will create empowerment and space for a critical reflection of current practices.
2. **Start using soil quality assessment**
   Collecting and analyzing soil data will enable PIN and beneficiaries to conduct needs assessment and to evaluate and describe the impact of different project interventions on soil quality.
3. **Use the results of soil quality assessment for project and program design and to direct interventions**
   Evidence-based planning will enable PIN to increase project relevance and impact, and support beneficiaries in sustainable land management.



DID YOU KNOW THAT:
Agricultural soils are among the planet's largest reservoirs of carbon and hold potential for expanded carbon sequestration (CS), and thus provide a prospective way of mitigating the increasing atmospheric concentration of CO_2. It is estimated that in 25 years soils can sequester more than 10% of the anthropogenic emissions.

Extracted from FAO: What is Soil Carbon Sequestration?

2. WHAT IS SOIL QUALITY ASSESSMENT AND HOW TO USE IT?

Soil quality assessment uses various soil indicators to report on the current status of soils. In order to select appropriate indicators, one must first determine the assessment objectives, and then indicators must be measured across a representative set of lands and management practices.

HOW TO USE IT?

CONSULTANCY TOOL:
fertiliser application

Test the soil and use the data for seasonal management of fields

Since farmers often pay a lot for fertilizers and improved seeds, they need a good knowledge of the fertility status of their soil in order to make informed decisions. Making farmers aware of the status of their soil and giving them the means to improve their soil fertility can increase their yields tremendously. Depending on the method and device used for testing, farmers can gain precise or at least orientational information about basic soil indicators. This requires PIN teams to conduct basic field measurements or to support local service providers or extension workers with the skills and technical equipment to conduct such analyses for farmers on a regular basis.

→ **What do we want to measure: Nitrogen, Phosphorus, Potassium, Soil pH, Electric conductivity.**

NPK are key nutrients for plants' growth. Soil pH affects the soil's physical, chemical, and biological properties and processes, as well as plant growth. The nutrition, growth, and yields of most crops decrease where pH is low and increase as pH rises to an optimum level. Electric conductivity indicates water uptake restrictions, nutrient availability to plants and possible toxicities.

INTERNAL TOOL:
project monitoring

Monitor soil quality within PIN's projects and use the assessment results for internal programming and as an advocacy tool for donors

How can we know PINs actions increase the quality of soils in areas where agricultural programs are being implemented? The answer is to monitor the change of chosen soil properties which serve as a proxy for the overall health of the soil ecosystem. This requires PIN teams to choose appropriate indicators, establish baselines and collect comparative data to demonstrate progress.

→ **What do we want to measure: Soil organic carbon**

Soil organic carbon indicates a source of energy for microorganisms and a trigger for nutrient availability.

TRAINING TOOL:
transferring the skill
to farmers

Build capacities of farmers to examine and understand their soil

Soil assessment can go far beyond simply measuring progress. It can stimulate a process to enhance the overall understanding of environmental links, especially to increase the level of knowledge and skills concerning the relationship between a healthy soil-ecosystem and sustainable yields. Indicators must not only be relevant to local people, but the methods used to collect, interpret and display data must be easily and effectively used by non-specialists so that local communities can be active participants in the process. This requires PIN teams to facilitate training sessions for farmers and/or extension workers using easy and cheap soil assessment methods – such as visual soil assessment.

→ **What do we want to measure: Soil structure, soil color, surface ponding, surface crusting and the presence of earthworms**

These are the basic visual indicators which give a general idea about the current soil status

3. ARE YOU PLANNING A NEW PROJECT ON SUSTAINABLE LAND MANAGEMENT OR CLIMATE SMART AGRICULTURE?

Include soil quality assessment in your project design!

Assess the use and awareness of soil information among stakeholders and include it in your stakeholder analysis

INCLUDE SOIL IN YOUR STAKEHOLDER ANALYSIS

Include environmental sustainability outcomes (e.g. increased environmental resilience of an area, efficient use of fertilizers, etc.) and soil quality indicators in the project proposal -> see INDIKIT

DEFINE SOIL-RELATED OUTCOMES AND INDICATORS

Include costs for soil assessment tools, tests and the PIN consultant in your budget

BUDGET FOR SOIL ASSESSMENT

Include soil assessment in your baseline study

CONDUCT A SOIL QUALITY BASELINE

4. OR ARE YOU ALREADY RUNNING A PROJECT AIMED AT SUSTAINABLE LAND MANAGEMENT OR CLIMATE SMART AGRICULTURE?

Include soil quality assessment in your project activities!

Example A:

We want to give advice to farmers which fertilizer to use to increase yields

Example B:

We want to know the long-term (3+ years) effect of our program on soil quality

Example C:

We want to build capacities of farmers to assess their soil

Identify your target group from project beneficiaries and define the area for assessment

Basic indicators:
Nitrogen, Phosphorus, Potassium, pH,
(electric conductivity)

Regularly conduct in-field measurements
Use field test kit or infra-red spectroscopy

Basic indicator:
Soil carbon

Establish baseline and collect comparative data
Use laboratory analysis or infra-red spectroscopy

Basic indicators:
Soil structure, soil color, surface ponding, surface crusting, earthworms

Introduce soil assessment in your trainings
Use visual soil assessment and field test kit

1. CLARIFY THE PURPOSE OF SOIL ASSESSMENT
2. ESTABLISH CONTEXT
3. IDENTIFY SOIL INDICATORS
4. CHOOSE A METHOD, COLLECT DATA AND MONITOR PROGRESS

5. SUPPORT PACKAGES

CAPACITY-BUILDING PACKAGES FROM PIN

1. Skype consultation with PIN consultant within Monthly Advisory Call

- → **What can I expect:** to gain more information on what soil assessment is, information on available methods, and how it can be used in the country program
- → **Aimed at:** Agricultural program managers
- → Time needed: 1 hour

2. Remote support on soil assessment

- → **What can I expect:** to receive guidance on developing a soil assessment plan and on the implementation of steps (context-analysis, soil assessment, etc.)
- → **Aimed at:** Agricultural program managers
- → Time needed: 1 month (but can be distributed over longer period)

3. Access to online tutorials and training materials

- → **What can I expect:** links to tutorials and materials which provide guidance on soil assessment
- → **Aimed at:** Agricultural program managers and technical staff
- → Time needed: varying

4. In-country training on key issues in soil assessment (theory and practical application) and preparation of a soil assessment plan together with the team

- → **What can I expect:** consultant goes to country program to conduct training to local staff
  - → Topics covered: introduction to applied soil ecology, soil fertility, sampling, visual soil assessment, basic measurements, interpretation of results, formulating management advice
- → **Aimed at:** Agricultural program managers, technical field officers
- → Time needed: 5 days training + 2 days monitoring plan development
- → Costs: day fee for trainer & meals, flight ticket

5. In-country support with soil assessment

- → **What can I expect:** receive support with soil assessment (conduct context analysis, do a baseline, etc.)
- → **Aimed at:** whole country program
- → Time needed: depending on task
- → Costs: day fee for trainer & meals, flight ticket

FARMER SUCCESS STORY
(Kenya, SoilCares Foundation)

Mary is the mother of eight children and works full time on the farm while her husband works as a matatu driver. She grows maize, sorghum, boma rhodes, beans and vegetables in her 2 acre piece of land. Mary suspected her land was not fertile, because she had planted crops but they were not doing well. She explains: "Maize was thin and highly susceptible to diseases. It could even turn yellow at a certain stage. On some parts of the field I could plant and add all inputs, but I never used to harvest anything".

After Mary tested her soil it turned out to be extremely acidic. She was advised to use lime and organic manure. The report also showed her land was suitable for growing sorghum, which she never used to plant. Based on the management advice she planted sorghum in 0.1 acre piece of land which could previously not sustain any crop and harvested 50 kg of sorghum.

RECOMMENDED EXTERNAL EDUCATIONAL MATERIALS AND SERVICES

1. Educational materials on soil

→ **What can I expect:** 3 series of user-friendly (comic-style) printed educational materials for extension staff and farmers:

a. Soil Testing Series

1. Why should I test my soil?
2. How do I collect a good soil sample?
3. What do the recommendations of the soil test report mean?

b. Soil Series

1. What is a fertile soil?
2. How does the soil feed the crop?
3. What can I do to keep my soil fertile?

c. Fertilizer Series

1. How and why should I apply fertilizer?
2. What are the differences between mineral fertilizers?
3. How do I make compost?

→ *Costs: 100 EUR per publication + 1 EUR per printed copy*

2. Soil test kit package

→ **What can I expect:** tests for measuring pH and NPK availability

→ Costs: from 20 EUR for 40 tests

3. Soil Scanner technology

→ **What can I expect:** Soil Scanner – equipment which enables instant testing of soil through infra-red light – pH, nutrients, electric conductivity, organic carbon and management advice to farmers

→ Costs: 2500 EUR for the device and subscription costs (4 euros per 1 soil sample analysed)

→ *online source: http://www.soilcares.com/en/products/scanner/*

Note: only available for Myanmar, Philippines, Zambia

4. Laboratory soil test conducted in CZ (VÚMOP)

→ **What can I expect:** basic laboratory soil analysis for nutrients, pH, organic carbon

→ Costs: 20 EUR