



Soil

Prayer – Psalm 104: 1, 24, 27-31, 35

- ¹ Praise the Lord, O my soul. Lord my God, you are very great.
- ²⁴ How many are your works, Lord!
In wisdom you made them all; the earth is full of your creatures.
- ²⁷ All creatures look to you
to give them their food at the proper time.
- ²⁸ When you give it to them, they gather it up;
when you open your hand, they are satisfied with good things.
- ²⁹ When you hide your face, they are terrified;
when you take away their breath, they die and return to the dust.
- ³⁰ When you send your Spirit, they are created,
and you renew the face of the ground.
- ³¹ May the glory of the Lord endure for ever;
may the Lord rejoice in his works.
- ³⁵ Praise the Lord, O my soul. Praise the Lord.

Why Soil?

**We know more about the
movement of celestial bodies
than about the soil underfoot.**

Leonardo da Vinci

Why Soil?

'Cinderella' Subject

- previously given little attention – taken for granted
- recently has gained recognition – can't be ignored

Healthy soil is vital for :

- food security
- maintaining biodiversity
- carbon capture & climate change
- water storage & filtration

Parable of Soils (the Sower) - Mark 4:14-20

¹⁴ The farmer sows the word.

¹⁵ Some people are like seed along the **path**, where the word is sown. As soon as they hear it, Satan comes and takes away the word that was sown in them.

¹⁶ Others, like seed sown on **rocky places**, hear the word and at once receive it with joy. ¹⁷ But since they have no root, they last only a short time. When trouble or persecution comes because of the word, they quickly fall away.

¹⁸ Still others, like seed sown among **thorns**, hear the word; ¹⁹ but the worries of this life, the deceitfulness of wealth and the desires for other things come in and choke the word, making it unfruitful.

²⁰ Others, like seed sown on **good soil**, hear the word, accept it, and produce a crop — some thirty, some sixty, some a hundred times what was sown.

Parable of Soils (the Sower) - Mark 4:14-20



Sower with Setting Sun
Vincent van Gogh 1888

- **Sower**
 - God (Father, Son, Holy Spirit)
 - servants (evangelists, teachers)
- **Seed**
 - message of the kingdom
(Word of God, Gospel)
- **Soil**
 - our response
(ears, eyes, mind, heart)

Types of Soil – Responses to the Word of God

Soil Type	= Signifies	→ Result	← Influence
Path	= hard heart	→ no faith	← devil 'takes away the word'
Rocky	= shallow heart	→ superficial faith	← flesh 'no roots ... fall away'
Thorny	= crowded heart	→ weak faith	← world 'chokes the word'
Good	= receptive heart	→ strong faith	← Word 'produces a crop'

Types of Soil

- **Good**
 - Soil composition
- **Thorny**
 - Soil pollution
- **Rocky**
 - Soil erosion
- **Path**
 - Soil compaction

THE PARABLE



OF THE SOWER



OR THE PARABLE OF THE FOUR TYPES OF SOIL

Soil Layers



← Vegetation

← Topsoil

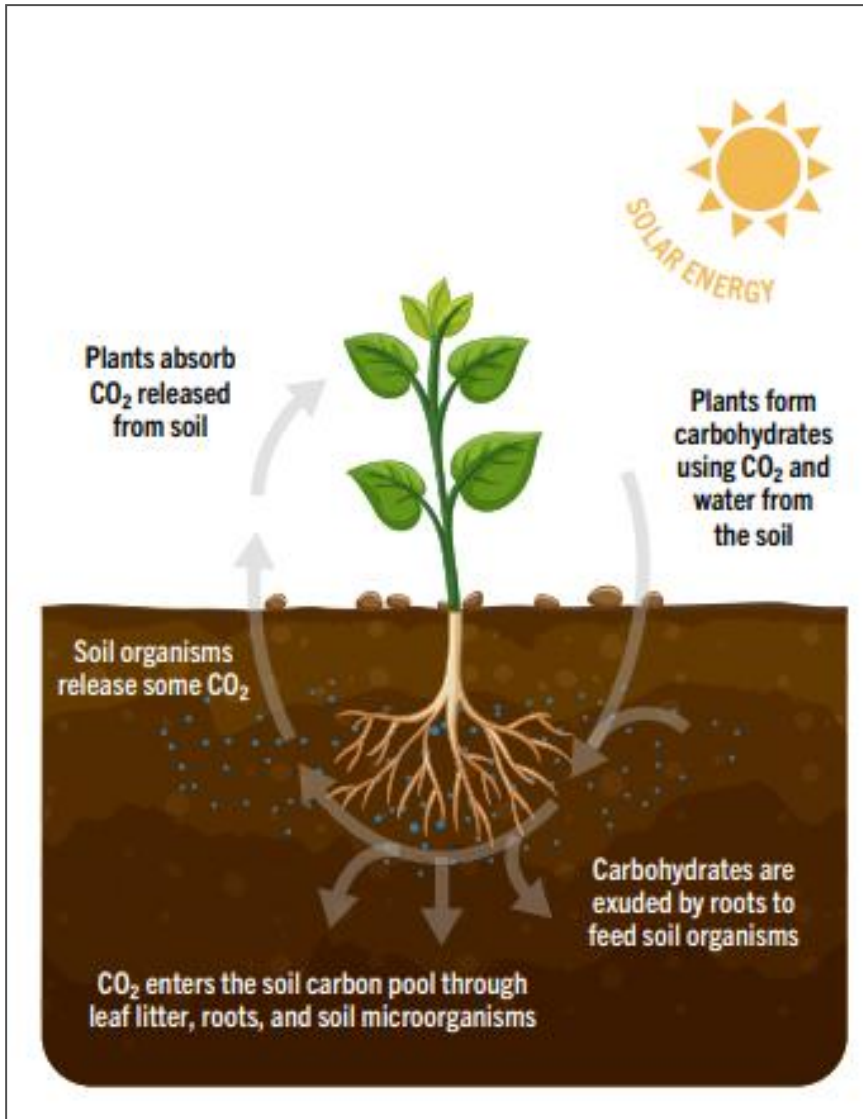
← Sub-soil

← Bedrock

'Good Soil' – Soil Composition

- **Water** – ↑ water ↓ air → root death
- **Air** – ↓ water ↑ air → plant death
- **Minerals** (derived from bedrock)
 - Sand – large particles, light, drains well, ↓ nutrients, acidic
 - Clay – small particles, heavy, wet in winter, ↑ nutrients
 - Silt – intermediate particles, light, moist, compacts easily
 - Chalk – calcium carbonate, alkaline, drains well
- **Soil Organic matter** (SOM)
 - Decaying plants – bind soil particles, ↓ erosion
 - Microbes – plant decomposition, ↑ nutrients
 - Earthworms – aeration, water retention, ↑ root growth
 - Fungi – plant communication (www!), ↓ disease

The Carbon Cycle



chlorophyll converts light energy into chemical energy (photosynthesis)



CO₂ (atmosphere) + H₂O (soil)



carbohydrates (CHO) + oxygen



CHO feed plants to enable growth

CHO feed soil organisms via roots

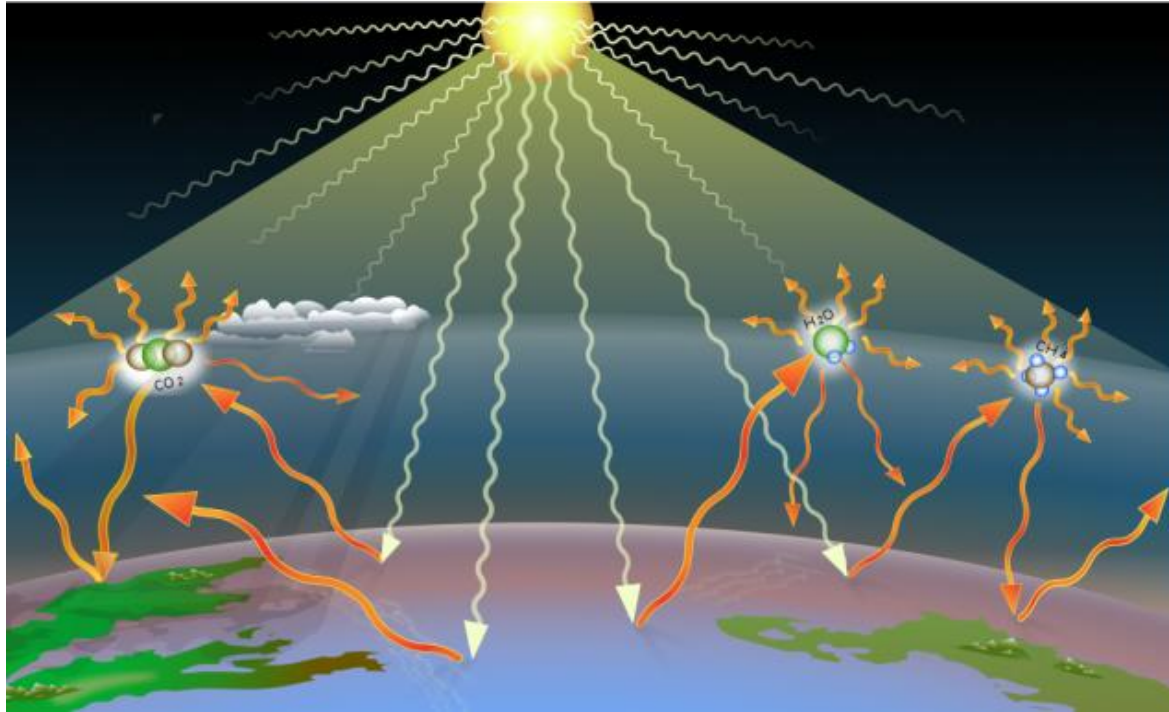


CO₂ enters soil carbon pool via roots, also from leaf litter, soil organisms



some CO₂ is released from soil into atmosphere

Global Warming



- earth absorbs solar energy → radiates it back as infrared waves
- infrared waves → atmosphere → back into space
- carbon dioxide (CO₂), methane (CH₄) and water (H₂O) absorb infrared energy and re-emit it back to earth → heat

Carbon Sequestration

- **CO₂ is the most commonly produced greenhouse gas**
 - **↑ atmospheric CO₂ is a major cause of global warming**
 - **Sequestration = storage of CO₂ not in atmosphere**
 - 80% of terrestrial carbon is in soil
 - 20% of terrestrial carbon is in plants & animals
 - **Soil carbon : Atmospheric carbon = > 2:1**
 - Small loss of soil carbon → huge ↑ in atmospheric carbon
- Conversely:
- Small ↑ of soil carbon → huge ↓ in atmospheric carbon

Carbon Sequestration

1 ton of soil organic matter (SOM) contain ½ ton carbon

Planting trees is vital ...

... but preserving soil is even more important!

Global wetlands & peatlands = 3% of global land mass ...

... but they contain more carbon than all rain forests

... they lock up carbon for 100-1000s of years

... waterlogged, cold, acidic conditions slows decomposition

Carbon capture improved by:

- Preserving wetlands, mangrove swamps, salt marshes
- ↑ soil organic matter
- ↓ soil erosion, soil degradation & desertification

Importance of right plant / right place

'Life Scientific' – Radio 4, 31 May 2022

Host – Jim Al-Khalili

Guest – Pete Smith (Professor of Soil & Global Change, Aberdeen Uni)

1980's UK tax breaks to plant spruce in peatlands

- lowering water table → allowed O₂ to penetrate the peat
- oxidisation of organic matter → release of CO₂ to atmosphere
- draining peatlands → loss of 30 tons of CO₂ per hectare

Planting trees on grasslands (steppe)

- grasslands too dry support tree growth long-term
- soil disturbance releases carbon
- upsets the balance of nature, biodiversity

'Thorny' Soil - Soil Pollution - a thorny problem!

Industry

- Mining – toxic waste, metals, plastics
- Acid rain – atmospheric pollution, crossing boundaries
- E-waste – metals, chemicals, plastics

Agriculture

- Fertilisers – intensive farming
- Pesticides – excessive use

Municipal (domestic & public services)

- Landfills – water percolates through garbage
- Sewage – water-borne diseases
- Waste water – chemicals, micro-plastics

‘Thorny’ Soil - Soil Pollution

Adverse effects of pollutants

- Leach into soil, rivers, aquifers
- Poison plants & soil microbes
- Upset balance of nature, ecosystems
- Enters food chain – plants, animals
- Human health – chemical poisoning, infection
- Prolonged effects – plastics, nuclear waste

Soil is a precious free gift from God; it is vital for life.

When we abuse it we harm ourselves and future generations, potentially for many years – and we scorn the God who gave it.

'Rocky' Soil – Compton Down, IoW, 2nd Aug 2022



← exposed location

← sparse vegetation

← thin topsoil

← chalk bedrock

'Rocky' Soil – Soil Erosion

Causes

- **Water**
 - High rainfall esp. steep slopes (soil washed away)
 - Removal of vegetation (trees/hedges slow water transit)
- **Wind**
 - Open flat land (helped by winter planting in fields)
 - Dry soil (fine 'dust' particles blown away)

Effects

- Potentially irreversible → desertification
- ↑ Carbon loss → CO₂ in atmosphere → ↑ global warming
- ↑ Flood risk → crop failure → ↓ food security

'Rocky Soil' – Soil Erosion

- 'In the last 40 years the earth has lost one-fifth of its topsoil.'
Ronald Sider – *Redeeming the Environment*
- 'The average amount of topsoil lost per hectare (100m x 100m) annually in the U.S., due to wind, and more particularly water, is 18 tonnes.'
George Miller – *Living in the Environment*
- '10 million hectares of cropland are being lost each year worldwide. Topsoil loss is 10 to 40 times the natural renewal rate'
D. Pimental – *Soil Erosion, A Food and Environmental Threat*

'Path' – Soil Compaction

- **Causes**

- vehicles – heavy farm machinery
- livestock – large numbers of cattle
- walking – away from designated paths
- urbanisation – buildings, roads

- **Effects**

- ↓ seed germination
- ↓ root penetration
- ↓ water penetration
- ↑ water run-off, flooding
- ↓ biodiversity

UK Soil Association

Current State of UK soils

- Loss of SOM – ↓ nutrients, ↓ carbon capture
- Agro-chemicals – ↑ fertilisers & pesticides
- Compaction – ↑ water run-off, flooding
- Degradation – ↓ food production & food security

Reasons

- Cultural – dependence on agro-chemicals
- Industry – lack of research, vested interests
- Finance – pressure to produce cheap food
- Governance – poor regulatory framework

UK Soil Association

Increase Soil Organic Matter (SOM)

- ↑ long-term soil fertility – ↑ food security
- ↑ water storage – ↓ flooding
- ↑ water quality – filters pollutants
- ↓ soil erosion – SOM binds soil particles, ↓ loss into rivers
- ↑ carbon sequestration – slows global warming

Target : ↑ SOM by 20% in 20 years → equivalent to:

- planting forest 75% the size of Wales
- taking 1 million cars off the roads
- 13% reduction in total UK agricultural greenhouse gas emissions

UK Soil Association Recommendations for Agriculture & Horticulture

- Increase the amount of plant & animal matter going onto fields
- Improve soil health monitoring across the UK
- Encourage soil organisms that build up soil and release nutrients
- Cover up bare soil with continuous plant cover
- Preserve hedgerows and bring more trees onto farmland
- Reduce soil compaction from machinery and livestock
- Design crop rotations to improve soil health

Soil – Some Biblical Principles

Soil is a gift from God – to be cared for

The LORD God took the man (Adam) and put him in the Garden of Eden to work it and take care of it (**Gen 2:15**)

Isaac planted crops in that land and the same year reaped a hundredfold, because the LORD blessed him (**Gen 26:12**)

Human sin has consequences – it effects the land

There is no faithfulness, no love, no acknowledgment of God in the land ... Because of this the land dries up, and all who live in it waste away; the beasts of the field, the birds in the sky and the fish in the sea are swept away (**Hosea 4:1,3**)

Soil – Some Biblical Principles

Sabbath Rest – restores soil

But in the seventh year the land is to have a year of sabbath rest, a sabbath to the LORD. Do not sow your fields or prune your vineyards ... The land is to have a year of rest (**Lev 25:4,5**)

The land enjoyed its sabbath rests; all the time of its desolation it rested, until the seventy years were completed (**2 Chr 36:21**)

The need for spiritual reawakening – pray for revival

Sow righteousness for yourselves, reap the fruit of unfailing love, and break up your unploughed ground; for it is time to seek the LORD, until he comes and showers his righteousness on you. But you have planted wickedness, you have reaped evil (**Hos 10:12,13**)

Restoring your Soil

- **Nutrition** - compost
- **Water** - vital for life
- **Mulching** - ground cover
- **Compaction** - deal with it
- **Pollutants** - avoid
- **Biodiversity** - encourage
- **Fallow ground** - restore

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Restoring your Soul

- **Bible** - regular feeding
- **Holy Spirit** - living water
- **Prayer** - cover everything
- **Hardness** - confess it
- **Watch** - eyes, ears, mind
- **Diversity** - people, gifts
- **Sabbath Rest** - repair

Prayer

Lord, you have given us this world to live in.

We praise and thank you for its beauty and diversity.

Help us to use its riches and resources with wisdom and sensitivity.

Bless and guide all who are working on the land.

We pray for all who supply our food and daily needs,
all who are involved in research with soil, crops and cultivation.

Forgive us for polluting soil through neglect and greed.

Bless those who are working to restore the land.

Help us to live in ways that please you ... O Lord, restore our soul.

Amen

Key Points Questions?

- God is good – soil is His gift, vital for plant & animal life
- Good soil is rich in organic matter – it captures carbon
- Soil pollution is due to human greed & neglect – it lasts for years
- Erosion is a major cause of cropland loss – ↓ global food security
- Compaction is due to poor land management – ↓ plant growth
- ‘Mulch’ everything in prayer – pray for those who work the land
- International cooperation is key – pray for world leaders