

A photograph of a flooded field. The water is murky and reflects the sky and the surrounding green vegetation. In the background, there are some industrial buildings or structures. The text is overlaid on the image in a large, red, serif font with a white outline.

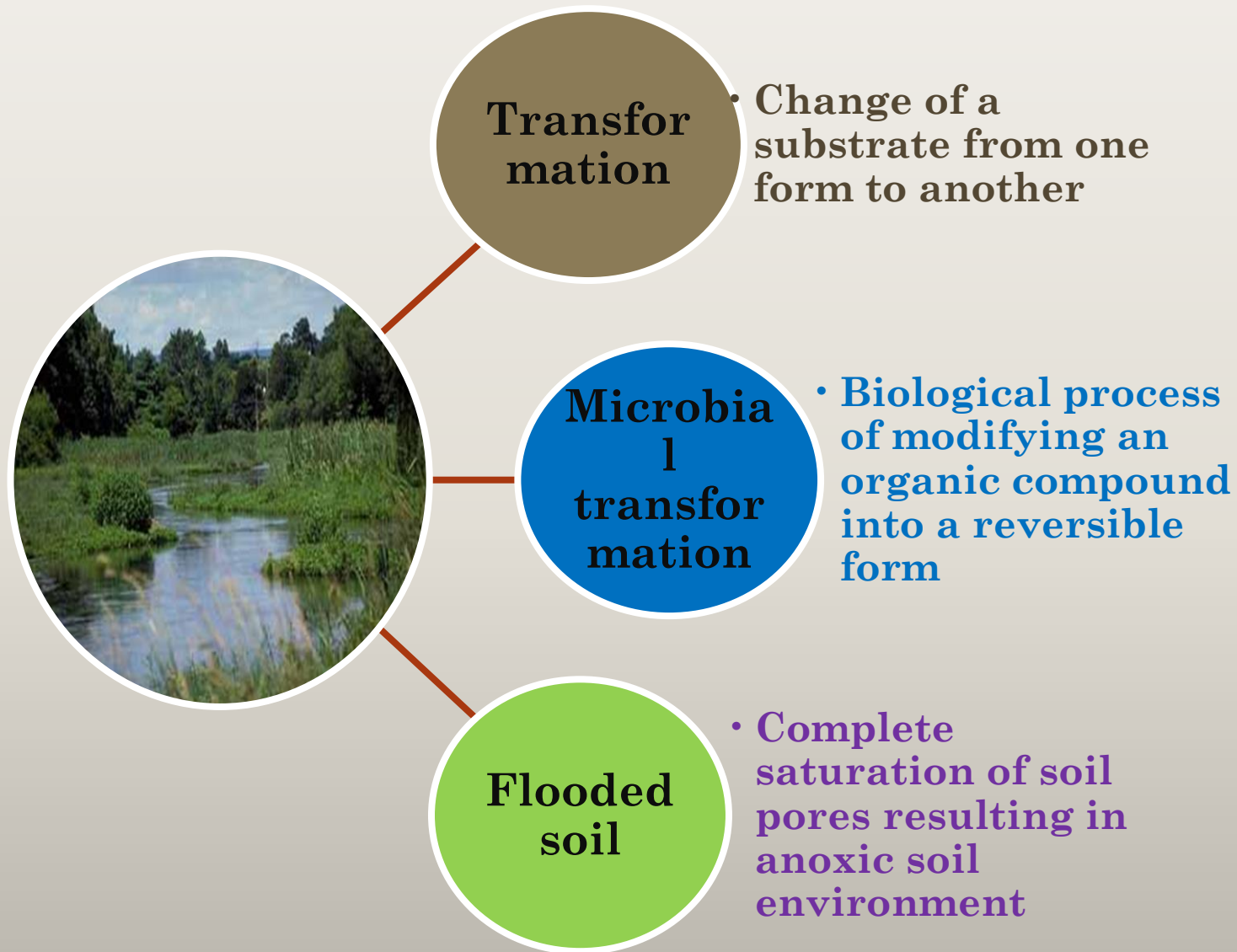
# Microbial Transformation In Flooded Soil Environment

# Contents

- **Definitions**
- **Reactions in flooded soil**
- **Mobility of minerals and plant nutrient availability**
- **Microbial activity**
- **Microbes involved in flooded soil**



# DEFINITIONS



# REACTIONS IN FLOODED SOIL

- **Redox reactions:**

- In redox reactions, one molecule (the reducing agent) loses electrons and another molecule (the oxidizing agent) accepts electrons.

- Example :

- Cellular respiration

- Glucose(red) + oxygen(oxi)  $\longrightarrow$  Co<sub>2</sub> + H<sub>2</sub>O



# MOBILITY OF MINERALS & AVAILABILITY OF NUTRIENTS

- Role in mobility of trace metal, minerals & nutrients.
- Use of available nutrients as alternative electron acceptors.
- Examples:
- Sulfate, nitrate & iron



# MICROBIAL ACTIVITY

- Replacement of oxygen in anaerobic respiration.
- Fermentation.

## Microbes involved in flooded soil

Nitrate Reducing Bacteria:

When available oxygen is depleted and nitrate is available, denitrification, the reduction of  $\text{NO}_3^-$  to  $\text{NO}$ ,  $\text{N}_2\text{O}$ , or  $\text{N}_2$ , primarily occurs. Denitrification is carried out by obligate respiratory bacteria belonging to the genera *Agrobacterium*



# MICROBES INVOLVED IN FLOODED SOIL

- **Iron/Manganese Reducing Bacteria**
- Ferrous iron is used as electron acceptor by iron-reducing bacteria such as *Geobacter* (*Geobacter metallireducens*)
- **Sulfate Reducing Bacteria**
- Bacteria can use organic compounds as an electron donor and sulfate as an electron acceptor. This reaction is carried out by sulfate-reducing bacteria such as *Deulfobacter*
- $\text{CH}_3\text{COO}^- + \text{SO}_4^{2-} + 3 \text{H}^+ \rightarrow 2\text{CO}_2 + \text{H}_2\text{S} + 2 \text{H}_2\text{O}$
- 

