# Life on land – Autofarmer

The big picture – why is this relevant?

By 2030, combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world.

Learning objectives:

* Understand what the Global Goals are
* Understand what goal 15 is and its significance
* Understand the basics of transmitting data
* Produce a data node product to meet the success criteria
* Develop the product further with additional features

Engagement – How can I engage learners?

* Learners may be engaged and motivated by the Global Goals context
* Learners will enjoy working unfamiliar components and may be inspired by the concept of being to control the real world using relays and microcontrollers

Assessment for learning

**Expected progress:**

* Learners follow the guide and create a product that meets the first success criteria

**Good progress:**

* Learners create a product that meets more than one of the success criteria and improve the product from initial designs

**Exceptional progress:**

* Learners create a complete product that meets all success criteria. Learners iteratively improve the product and add additional functionality

Key concepts:

* Global Goals (target 15.3)
* End desertification and restore degraded land
* Sensors
* That a relay is a controllable switch
* Pins on the micro:bit having different functions
* Analogue and digital signals

Key words:

* Relay - <https://en.wikipedia.org/wiki/Relay>
* Moisture sensor - <https://en.wikipedia.org/wiki/Hygrometer>
* Light sensor - <https://en.wikipedia.org/wiki/Photodetector>
* GPIO (general purpose In Out) - <https://en.wikipedia.org/wiki/General-purpose_input/output>
* Digital and analogue - <https://en.wikipedia.org/wiki/Digital-to-analog_converter>

Differentiation:

This mini project is largely differentiated by outcome as the initial Input Process Output (IPO) design is provided and learners can simply create a program that meets the design. Stronger learners can start designing creating solutions for the other success criteria and teachers can support as necessary.

Resources:

* micro:bit(s)
* USB cable
* 3v dual relay module
* Micro:bit breakout board
* Moisture sensor
* Header wires (male and female)

Lesson flow

* Introduction to the global goals concept
* Introduction to the ‘life on land’ goal
* Discus why this goal is important and what may happen if we ignore it
* Introduce the success criteria and discuss initial ideas on how to solve the problem
* Explain how this is a simplified version of how it would work in real life (IRL) using the diagram in the slides
* Introduce the input, process, output (IPO) model and discuss what will be sensed by the micro:bit for this prototype (use the IPO table on the slides/activity sheet) and relate to the success criteria
* Discuss the sensors on the micro:bit and how other sensors can be used (if available)
* Put learners into small groups (2+) and explain that they will work as a team to design and build a prototype that meets the success criteria.
* Remind learners about the importance of communication and collaboration and how the designs should be reflected in the product
* Provide the learners with the activity sheet, micro:bits, peripherals and making resources
* Get the learners to start to design and create the prototype in their groups
* Encourage learners to use the IPO worksheet to plan their additional features

Making

This project does not involve building anything but does involve wiring together different components which can prove fiddly. Be prepared to troubleshoot loose wires, short circuits and troublesome components.