Water and Environment Support
in the ENI Southern Neighbourhood region

Risque de sédimentation des réservoirs et mesures d'atténuation en faveur de la durabilité en Tunisie
Activity No.: N-W-TN-2

Atelier de Consultation Nationale

18 Sep 2023, Hotel Golden Tulip El Mechtel, Tunis

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LDK Consultants Engineers & Planners SA

This Project is funded by the European Union

Terminology - Natural Water &Soil Retention Measures

DEFINITION BY THE EUROPEAN UNION
(WFD CIS Working Group Programme of Measures (WG PoM))

Natural Water & Soil Retention Measures (NWRM) are multi-functional measures that aim to protect and manage water resources and address water-related challenges by restoring or maintaining ecosystems as well as NATURAL FEATURES AND CHARACTERISTICS of water bodies using NATURAL MEANS AND PROCESSES. Their main focus is to enhance, as well as preserve, the water and soil retention capacity of aquifers, soil, and ecosystems with a view to improving their status. NWRM have the potential to provide multiple benefits, including the reduction of risk of floods and droughts, water quality improvement, groundwater recharge and habitat improvement. The application of NWRM supports green infrastructure, improves or preserves the quantitative status of surface water and groundwater bodies and can positively affect the chemical and ecological status of water bodies by restoring or enhancing natural functioning of ecosystems and the services they provide. The preserved or restored ecosystems can contribute both to climate change adaptation and mitigation.

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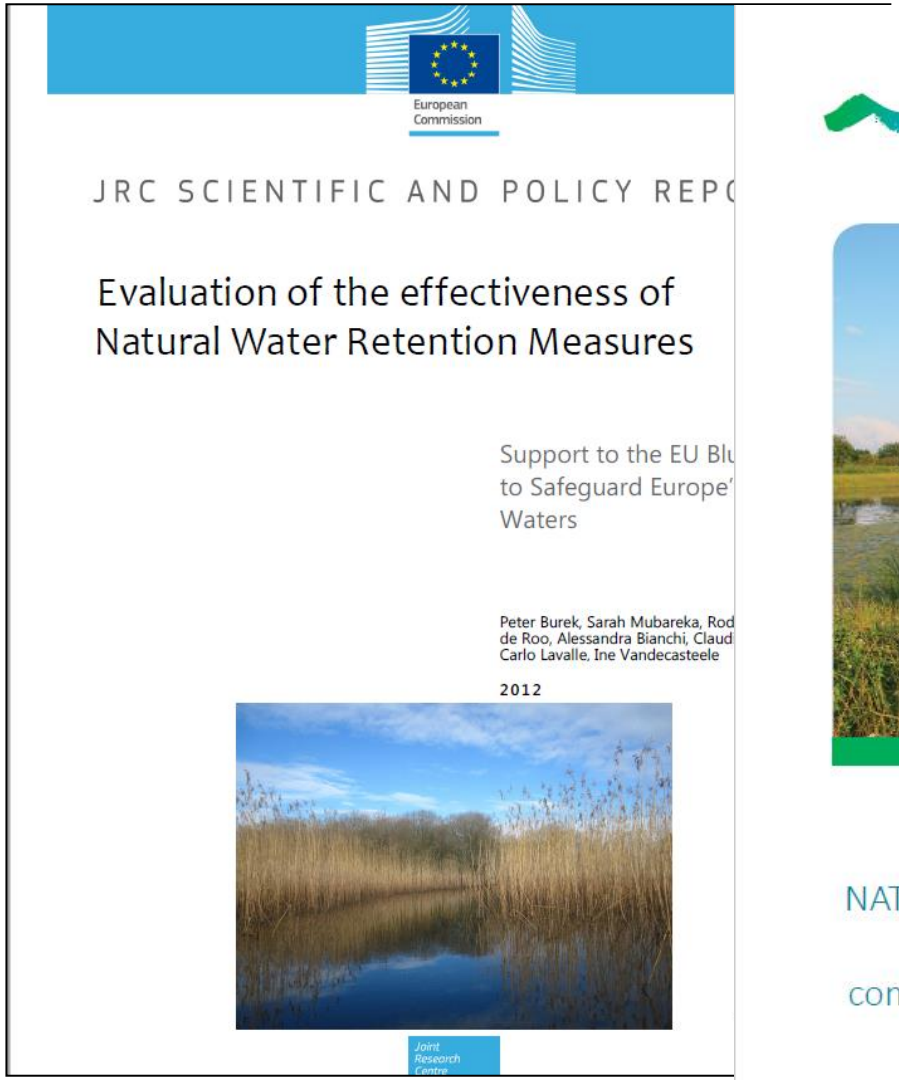
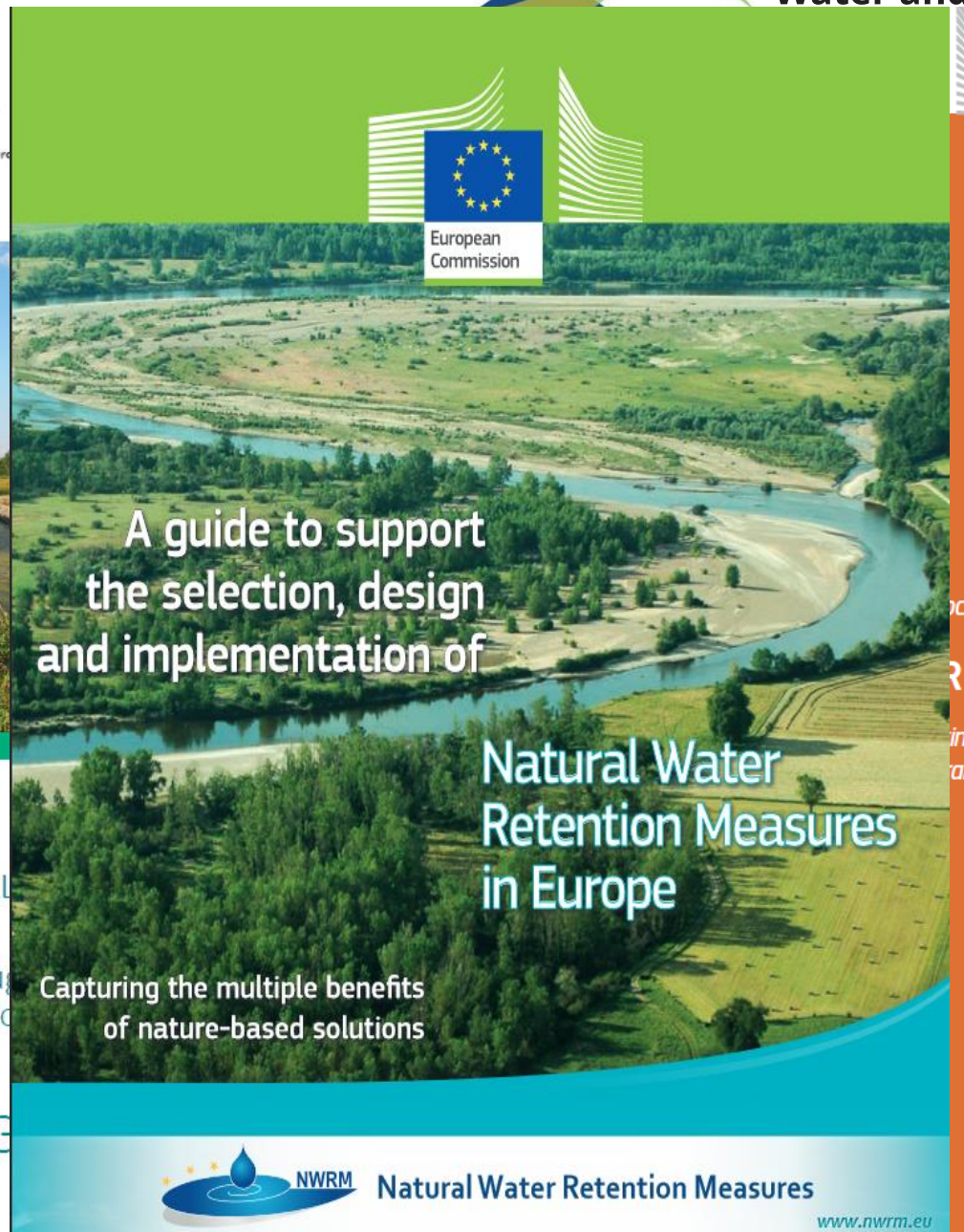
Definitions

Natural Water & Soil Retention Measures (NWSRMs)

- ✓Retain water (runoff or river flows) beyond the existing capacity of systems, releasing it at a controlled rate, or infiltrating it to groundwater;
- ✓Use the retention capacity of soils and of aquatic ecosystems to provide other environmental and well-being improvements, such as water quality, biodiversity, amenity value or resilience and adaptation to climate change impacts;
- ✓Are usually applied at relatively 'small scale', in comparison to the size of the water catchment or territory in which they are implemented;
- ✓Emulate a natural process, although are not always 'natural' features themselves (e.g. may need for civil engineering structures).

Definitions





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Key World

The Key World is the world “**Natural**”. What does this really mean?

- Option 1: Natural Systems are quite cheap although they do not have the same efficiency as “hard” solutions especially in high return period floods.
- Option 2: Principle “Design with Nature” and not “Design Against Nature”. That means sustainable solutions that bring nature and biodiversity within our cities.
- Issue of scale. Small is beautiful … but large is great? Perhaps, large is a total of smalls.

Natural Water Retention Measures (NWRMs)

Pros & Cons

- Limit the amount of water that enters the local storm sewer.
- Reduce the potential for flooding and drainage problems.
- Reduce the quantity of pollutants entering the storm sewer system.
- Restore and recharge the groundwater system.
- Low maintenance: They are planted with beautiful, hardy plants that require little to no water.
- Planting of native species in rain gardens will attract birds, butterflies and other beneficial insects, such as dragonflies (dragonflies eat mosquitoes).
- The efficiency is getting low as the intensity of rainfall is increasing.
- As they need space for deploying, they may be more expensive in areas with high land values.

Natural Water Retention Measures (NWRMs)

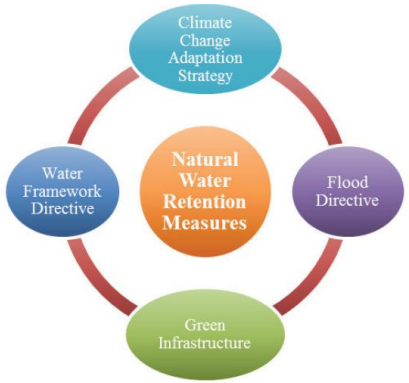
The simple Theory behind NWRMs

- Increase the concentration time in the catchment by contemporary storage, decrease of runoff peak.
- Increase the hydraulic roughness in the catchment, which is also increasing the concentration time.
- Store water in the catchment and release it slowly afterwards, the flood volume and runoff peak is also decreasing.
- Increase hydraulic roughness in the streams, flow velocity and kinetic energy goes down, reducing the risk of erosion or catastrophic flooding.
- Increase of flow depth, increase the frequency of less catastrophic or mild flooding.

Definitions

Table 1. Illustrating the diversity of measures classified as NWRM[1]

Type	Class	Non-exhaustive list of examples
Direct modification in ecosystems	**Hydro-morphology (Rivers, Lakes, Aquifers, connected wetlands)**	Restoration and maintenance of rivers, lakes, aquifers and connected wetlands; Reconnection and restoration of floodplains and disconnected meanders, elimination of riverbank protection…
	Agriculture	Restoration and maintenance of meadows, pastures, buffer strips and shelter belts; soil conservation practices (crop rotation, intercropping, conservation tillage…), green cover, mulching…
Change & adaptation in land-use & water management practice	**Forestry and Pastures**	Afforestation of upstream catchments; targeted planting for "catching" precipitation; Continuous cover forestry; maintenance of riparian buffers; urban forests; Land-use conversion for water quality improvements…
	Urban development	Green roofs, rainwater harvesting, permeable paving, swales, soakaways, infiltration trenches, rain gardens, detention basins, retention ponds, urban channel restoration…



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Definitions

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A1	Meadows and pastures
A2	Buffer strips and shelter belts
A3	Crop rotation
A4	Strip cropping
A5	Intercropping
A6	No tillage
A7	Reduced/conservation tillage
A8	Green cover
A9	Early sowing
A10	Traditional terracing
A11	Controlled traffic farming
A12	Reduced stocking density
A13	Mulching

F1	Riparian buffers
F2	Headwater areas
F3	Reservoir catchments
F4	Targeted planting for “catching” precipitation
F5	Land use conversion
F6	Continuous Cover forestry
F7	“Water sensitive” driving
F8	Appropriate design of roads and stream crossings
F9	Sediment capture ponds
F10	Coarse woody debris
F11	Urban forest parks
F12	Trees in Urban areas
F13	Overland Flow Areas
F14	Peak Flow control structures

U1	Green Roofs
U2	Rainwater Harvesting
U3	Permeable Paving and other permeable surfaces
U4	Swales
U5	Channels and Rills
U6	Filter Strips
U7	Soakaways
U8	Infiltration Trenches
U9	Rain Gardens
U10	Detention / Infiltration Basins
U11	Retention Ponds
U12	Managed Aquifer Recharge

N1	Basins and ponds
N2	Wetland
N3	Floodplain reconnection
N4	Re-meandering
N5	Revitalisation of flowing waters
N6	Temporary tributaries flow
N7	Hydraulic annexes
N8	Riverbed (alluvial mattress)
N9	Levelling of dams/ longitudinal barriers
N10	Natural bank stabilisation
N11	Elimination of riverbank protection
N12	Lakes
N13	Artificial groundwater recharge (AGR)
N14	Floodplain restoration (polder)

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Natural Water Retention Measures (NWRMs)

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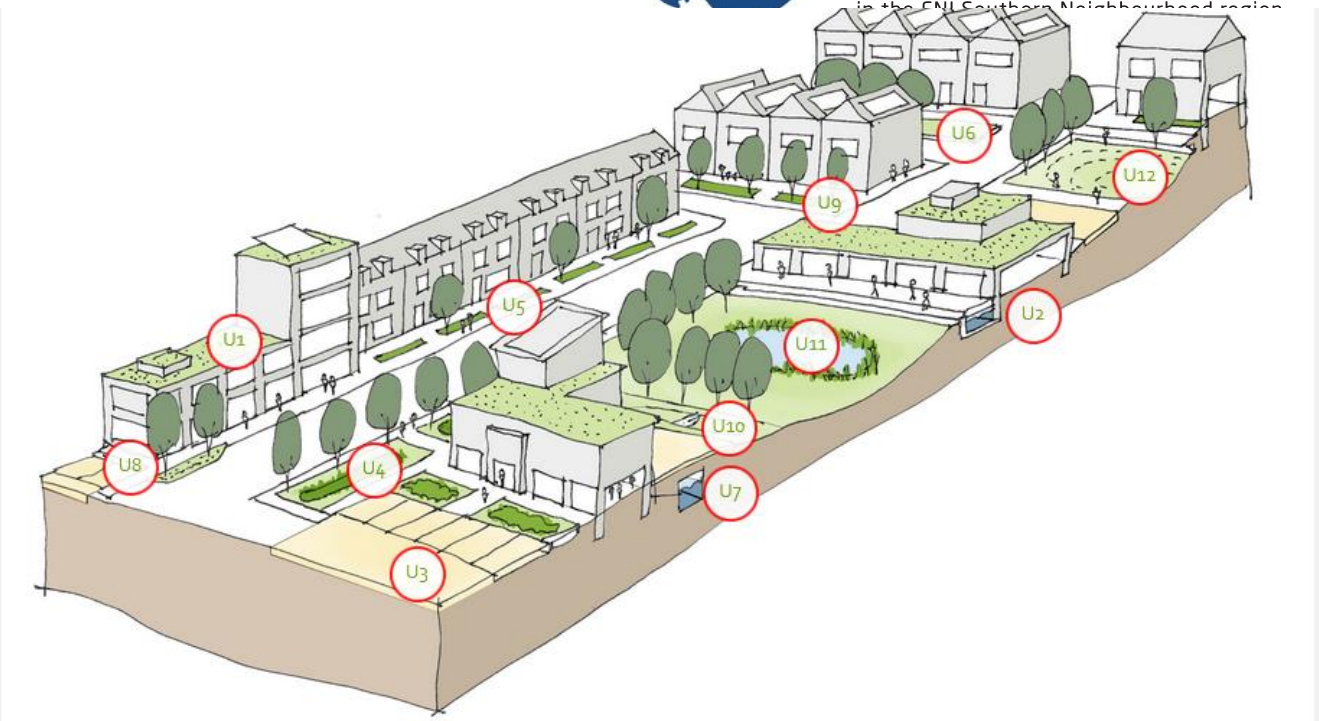
Urban Drainage



U01	Green Roofs
U02	Rainwater Harvesting
U03	Permeable surfaces
U04	Swales
U05	Channels and rills
U06	Filter Strips
U07	Soakaways
U08	Infiltration Trenches
U09	Rain Gardens
U10	Detention Basins

Natural Water Retention Measures (NWRMs)

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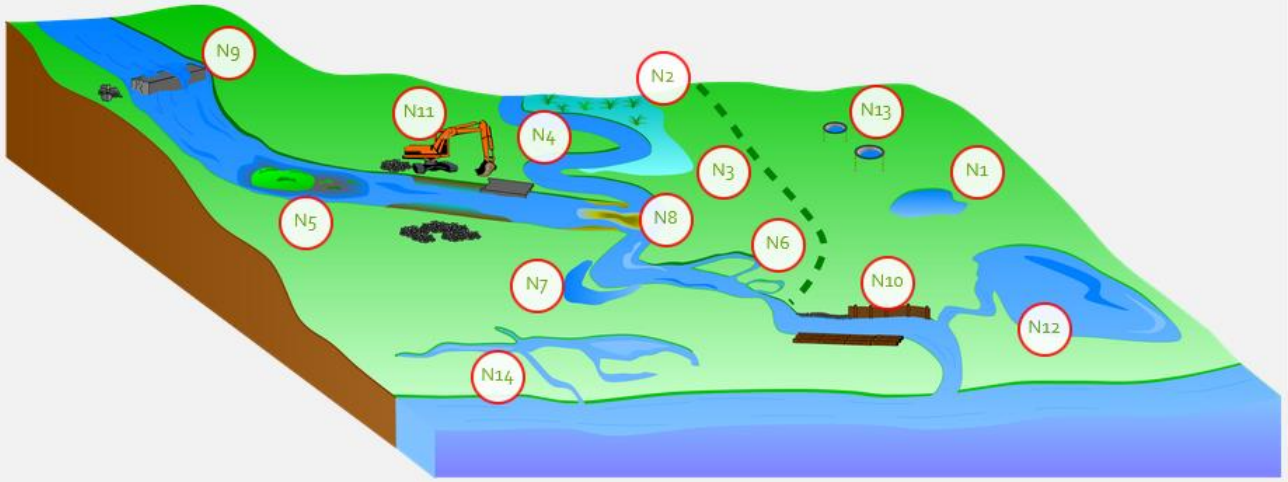
River Hydromorphology

Home » Hydro morphology

Hydro morphology



N01	Basins and ponds
N02	Wetland restoration and management
N03	Floodplain restoration and management
N04	Re-meandering
N05	Stream bed re-naturalization
N06	Restoration and reconnection of seasonal streams
N07	Reconnection of oxbow lakes and similar features
N08	Riverbed material renaturalization
N09	Removal of dams and other longitudinal barriers
N10	Natural bank stabilisation
N11	Elimination of riverbank protection
N12	Lake restoration
N13	Restoration of natural infiltration to groundwater
N14	Re-naturalisation of polder areas

Natural Water Retention Measures (NWRMs)

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Forestry, Natural Areas & Catchment Processes

F01	Forest riparian buffers
F02	Maintenance of forest cover in headwater areas
F03	Afforestation of reservoir catchments
F04	Targeted planting for 'catching' precipitation
F05	Land use conversion
F06	Continuous cover forestry
F07	'Water sensitive' driving
F08	Appropriate design of roads and stream crossings
F09	Sediment capture ponds
F10	Coarse woody debris
F11	Urban forest parks
F12	Trees in Urban areas
F13	Peak flow control structures
F14	Overland flow areas in peatland forests

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Natural Water Retention Measures (NWRMs)

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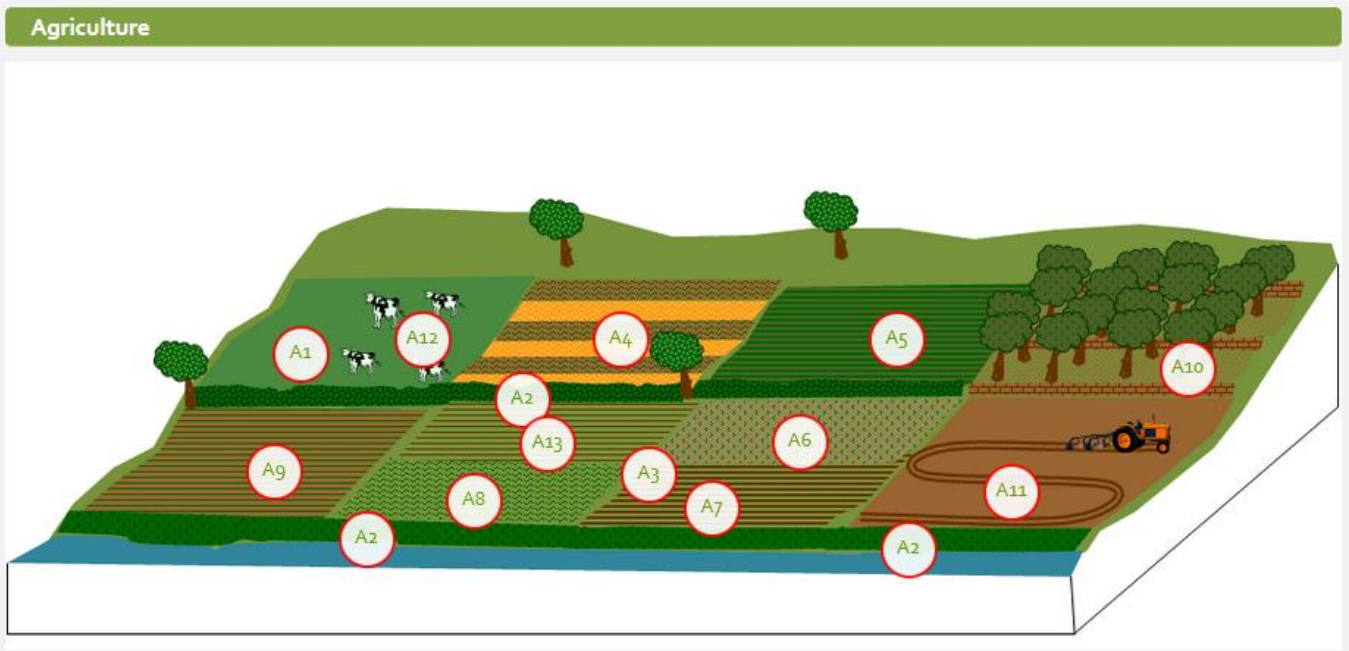
Agriculture



A01	Meadows and pastures
A02	Buffer strips and hedges
A03	Crop rotation
A04	Strip cropping along contours
A05	Intercropping
A06	No till agriculture
A07	Low till agriculture
A08	Green cover
A09	Early sowing
A10	Traditional terracing
A11	Controlled traffic farming
A12	Reduced stocking density
A13	Mulching

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Thank you for your attention!