

Table S1. Hierarchical trees and weights

| Service | Criteria and weights | | Sub-criteria and weights | | | | | |
|------------------------------------|----------------------|-------|------------------------------|--------------------------|--|-----------|------------------|-------|
| Provisioning | Potential | 0.500 | Land capability | 1.000 | | | | |
| | Human inputs | 0.500 | Crop destination | 0.667 | | | | |
| | | | Type of activity | 0.333 | | | | |
| Soil quality | Potential | 0.667 | Soil physical properties | 0.417 | Texture | 0.417 | | |
| | | | | Depth | 0.417 | | | |
| | | | | | Skeleton | 0.167 | Gravel | 0.500 |
| | | | Pebbles | 0.500 | | | | |
| | | | | Soil chemical properties | 0.417 | Fertility | 0.500 | |
| | | | Organic matter | | | 0.333 | | |
| | | | Salinity | | | 0.167 | | |
| | | | Soil hydraulic properties | 0.167 | Internal drainage | 0.400 | | |
| | | | | | Saturated hydraulic conductivity | 0.250 | | |
| | | | | | Available water capacity | 0.250 | | |
| | | | | | Water content | 0.100 | Gravimetric | 0.500 |
| | | | | | | | Capillary | 0.500 |
| | | | Human inputs | 0.333 | Crop type | 0.500 | | |
| | Type of activity | 0.333 | | | | | | |
| EfAs | 0.167 | | | | | | | |
| Erosion and mass movements control | Potential | 0.667 | Soil vulnerability | 0.667 | Potential surface erosion | 0.417 | | |
| | | | | Landslide hazard | 0.417 | | | |
| | | | | | Actual landslides | 0.167 | Type of movement | 0.500 |
| | | | Status | 0.500 | | | | |
| | | | Soil physical properties | 0.333 | Hydrologic group | 0.500 | | |
| | | | | | Slope | 0.333 | | |
| | | | | | Texture | 0.167 | | |
| | | | Human inputs | 0.333 | Hydrogeological constraint | 0.100 | | |
| | | | | | Length of crop cycle | 0.400 | | |
| | Type of activity | 0.300 | | | | | | |
| EfAs | 0.200 | | | | | | | |
| Water flows regulation | Potential | 0.667 | Soil moisture | 0.300 | Water shortage risk | 0.667 | | |
| | | | | | Annual average precipitation | 0.333 | | |
| | | | Soil hydraulic properties | 0.300 | <i>As for soil quality</i> | | | |
| | | | Soil physical properties | 0.200 | <i>As for erosion and mass movements control</i> | | | |
| | | | Distance from surface waters | 0.200 | Hydrographic network | 0.667 | | |
| | | | | | Hydraulic hazard | 0.333 | | |

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|-------------------------|--------------|-------|------------------------|-------|-------------------------|
| | Human inputs | 0.333 | Length of crop cycle | 0.500 | |
| | | | Type of activity | 0.333 | |
| | | | EFAs | 0.167 | |
| Maintenance of habitats | Potential | 0.667 | Ecological value | 0.500 | |
| | | | Habitats vulnerability | 0.333 | Anthropogenic pressures |
| | | | | | 0.667 |
| | | | | | Ecological sensitivity |
| | | | | | 0.333 |
| | | | Ecological network | 0.167 | Structural elements |
| | | | | | 0.667 |
| | | | | | Functional elements |
| | | | | | 0.333 |
| | Human inputs | 0.333 | Protected areas | 0.100 | |
| | | | Crop type | 0.400 | |
| | | | Type of activity | 0.300 | |
| | | | EFAs | 0.200 | |

Table S2: Attributes and weights

| Criteria and sub-criteria | | Attributes and weights | |
|---------------------------|--|------------------------|-------|
| Provisioning potential | Land capability (Source: Pedological Database) | Class I | 1.000 |
| | | Class II | 0.875 |
| | | Class III | 0.750 |
| | | Class IV | 0.625 |
| | | Class V | 0.500 |
| | | Class VI | 0.375 |
| | | Class VII | 0.250 |
| | | Class VIII | 0.125 |
| Soil quality potential | Texture (Source: Pedological Database) | LS, L, CL, SCL, SIL | 1.000 |
| | | SICL, SC | 0.667 |
| | | C, SIC, S, SL, SI | 0.333 |
| | Depth (Source: Pedological Database) | >100 cm | 1.000 |
| | | 75-100 cm | 0.800 |
| | | 50-75 cm | 0.600 |
| | | 25-50 cm | 0.400 |
| | | <25 cm | 0.200 |
| | Gravel and pebbles (Source: Pedological Database) | <0.3% | 1.000 |
| | | 0.3-3% | 0.800 |
| | | 3-10% | 0.600 |
| | | 10-15% | 0.400 |
| >15% | | 0.200 | |
| Rocks | | 0% | 1.000 |

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| (Source: Pedological Database) | <2% | 0.800 |
| | 2-4% | 0.600 |
| | 4-10% | 0.400 |
| | >10% | 0.200 |
| Fertility | Good | 1.000 |
| (Source: Pedological Database) | Rather good | 0.750 |
| | Moderate | 0.500 |
| | Low | 0.250 |
| | Organic matter | >3.18% |
| (Source: Pedological Database) | 2.39-3.18% | 0.800 |
| | 1.58-2.39% | 0.600 |
| | 0.79-1.58% | 0.400 |
| | <0.79% | 0.200 |
| | Salinity | <0.28 mS/cm |
| (Source: Pedological Database) | 0.28-0.75 mS/cm | 0.750 |
| | 0.75-1.5 mS/cm | 0.500 |
| | >1.5 mS/cm | 0.250 |
| | Internal drainage | Good |
| (Source: Pedological Database) | Rather good | 0.800 |
| | Rather bad | 0.600 |
| | Bad | 0.400 |
| | Very bad | 0.200 |
| | Saturated hydraulic conductivity | >10 $\mu\text{m/s}$ |
| (Source: Pedological Database) | 1-10 $\mu\text{m/s}$ | 0.800 |
| | 0.1-1 $\mu\text{m/s}$ | 0.600 |
| | 0.01-0.1 $\mu\text{m/s}$ | 0.400 |
| | <0.01 $\mu\text{m/s}$ | 0.200 |
| | Available water capacity | >200 mm |
| (Source: Pedological Database) | 150-200 mm | 0.800 |
| | 100-150 mm | 0.600 |
| | 50-100 mm | 0.400 |
| | <50 mm | 0.200 |
| | Gravimetric water content | >50 mm |
| (Source: Pedological Database) | 40-50 mm | 0.800 |
| | 25-40 mm | 0.600 |
| | 15-25 mm | 0.400 |
| | <15 mm | 0.200 |
| | Capillary water content | >500 mm |
| (Source: Pedological Database) | 400-500 mm | 0.800 |

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| | | 250-400 mm | 0.600 |
| | | 150-250 mm | 0.400 |
| | | <150 mm | 0.200 |
| Erosion and mass movements control potential | Potential surface erosion (Source: Pedological Database) | 0-5 t/ha y | 1.000 |
| | | 5-10 t/ha y | 0.833 |
| | | 10-20 t/ha y | 0.667 |
| | | 20-50 t/ha y | 0.500 |
| | | 50-150 t/ha y | 0.333 |
| | | >150 t/ha y | 0.167 |
| | | Landslide hazard (Source: ISPRA) | None |
| | Low | | 0.833 |
| | Moderate | | 0.667 |
| | Medium | | 0.500 |
| | High | | 0.333 |
| | Very high | | 0.167 |
| | Landslides type of movement (Source: Landslides Database) | None | 1.000 |
| | | Falls | 0.857 |
| | | Topples | 0.714 |
| | | Undetermined | 0.571 |
| | | Slides | 0.428 |
| | | Spreads | 0.285 |
| | | Flows | 0.142 |
| | Landslides status (Source: Landslides Database) | None | 1.000 |
| | | Stabilized | 0.800 |
| | | Undetermined | 0.600 |
| | | Quiescent | 0.400 |
| | | Active | 0.200 |
| | Hydrologic group (Source: Pedological Database) | A - Low runoff | 1.000 |
| | | B - Moderately low runoff | 0.750 |
| | | C - Moderately high runoff | 0.500 |
| D - High runoff | | 0.250 | |
| Slope (Source: DTM) | <5% | 1.000 | |
| | 5-13% | 0.833 | |
| | 13-20% | 0.667 | |
| | 20-35% | 0.500 | |
| | 35-60% | 0.333 | |
| | >60% | 0.167 | |
| Texture (Source: Pedological Database) | S, SL | 1.000 | |
| | L, LS | 0.833 | |

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| | | SIL, SI | 0.667 |
| | | CL, SICL | 0.500 |
| | | SC, SCL | 0.333 |
| | | C, SIC | 0.167 |
| Water flows regulation potential | Water shortage risk (Source: Pedological Database) | Absent or low | 1.000 |
| | | Moderate | 0.750 |
| | | High | 0.500 |
| | | Very high | 0.250 |
| | Annual average precipitation (Source: LaMMA Consortium) | >1350 mm/y | 1.000 |
| | | 1200-1350 mm/y | 0.857 |
| | | 1050-1200 mm/y | 0.714 |
| | | 950-1050 mm/y | 0.571 |
| | | 850-950 mm/y | 0.428 |
| | | 700-850 mm/y | 0.285 |
| | Hydrographic network (Source: Cartography of PIT-PPR) | <700 mm/y | 0.142 |
| | | 0-100 m | 1.000 |
| | | 100-250 m | 0.750 |
| | | 250-500 m | 0.500 |
| | Hydraulic hazard (Source: ISPRA) | >500 m | 0.250 |
| | | Very high | 1.000 |
| High | | 0.800 | |
| Medium | | 0.600 | |
| Moderate | | 0.400 | |
| | | Absent or low | 0.200 |
| Maintenance of habitats potential | Ecological value (Source: Nature map) | Very high | 1.000 |
| | | High | 0.800 |
| | | Medium | 0.600 |
| | | Low | 0.400 |
| | | Very low | 0.200 |
| | Anthropogenic pressure (Source: Nature map) | Very low | 1.000 |
| | | Low | 0.800 |
| | | Medium | 0.600 |
| | | High | 0.400 |
| | | Very high | 0.200 |
| | Ecological sensitivity (Source: Nature map) | Very low | 1.000 |
| | | Low | 0.800 |
| | | Medium | 0.600 |
| | | High | 0.400 |
| | | Very high | 0.200 |

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| Structural elements (Source: Cartography of PIT-PPR) | Forestry and semi-natural ecosystems | 1.000 | Primary nodes | 1.000 |
| | | | Secondary nodes | 0.857 |
| | | | Connection nuclei | 0.714 |
| | | | Wetlands | 0.571 |
| | | | Riparian corridors | 0.428 |
| | | | Connectivity matrices | 0.285 |
| | | | Low connectivity areas | 0.142 |
| | Agricultural ecosystems | 0.500 | Nodes | 1.000 |
| | | | Hills | 0.857 |
| | | | Plains | 0.714 |
| | | | Urbanized plains | 0.571 |
| | | | Fragmented | 0.428 |
| | | | Fragmented in abandonment | 0.285 |
| | | | Intensive | 0.142 |
| Functional elements (Source: Cartography of PIT-PPR) | Connectivity paths | 1.000 | Ecological corridors | 0.857 |
| | | | None | 0.714 |
| | | | In abandonment | 0.571 |
| | | | Infrastructures to mitigate | 0.428 |
| | | | High artificialization | 0.285 |
| | | | High artificialization and abandonment | 0.142 |
| | | | Crop destination (Source: LULC maps and ARTEA Database) | Food |
| Horticulturals | 0.920 | | | |
| Cereals | 0.880 | | | |
| Leguminous | 0.800 | | | |
| Vineyards | 0.760 | | | |
| Olive groves | 0.680 | | | |
| Various destinations | 0.750 | Arable crops | | 1.000 |
| | | Greenhouses | | 1.000 |
| | | Heterogeneous areas | | 0.400 |
| Animal rearing | 0.500 | Cereals for fodder | | 1.000 |
| | | Leguminous for fodder | | 0.833 |
| | | Fodder | | 0.667 |
| | | Pastures | | 0.500 |
| | | Grasslands | | 0.333 |
| | | Retired land | | 0.167 |
| Fibers and materials | 0.250 | Nurseries | | 1.000 |
| | | Arboriculture | | 0.875 |
| | | Forests | | 0.875 |

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| | | | Oleaginous | 0.875 | |
| | | | Ornamentals | 0.875 | |
| | | | Officinals | 0.750 | |
| Human inputs | Crop type (Source: LULC maps and ARTEA Database) | Forests | 1.000 | | |
| | | Permanent crops | 0.833 | | |
| | | Pastures and grasslands | 0.667 | | |
| | | "Miglioratrici" | 0.500 | | |
| | | "Rinnovo" | 0.333 | | |
| | | | "Depauperanti" | 0.167 | |
| | Length of crop cycle (Source: LULC maps and ARTEA Database) | Forests | 1.000 | | |
| | | Permanent crops | 0.833 | | |
| | | Poly annuals | 0.667 | | |
| | | Annuals | 0.500 | | |
| | | Seasonals (long cycle) | 0.333 | | |
| | | Seasonals (short cycle) | 0.167 | | |
| | Type of activity - Provisioning service (Source: LULC maps and ARTEA Database) | Professional organic | 1.000 | | |
| | | Professional conventional | 0.875 | | |
| | | Non-professional | 0.375 | | |
| | Type of activity - Regulating services (Source: LULC maps and ARTEA Database) | Professional organic | 1.000 | | |
| | | Non-professional | 0.667 | | |
| | | Professional conventional | 0.333 | | |
| | EFAs (Source: ARTEA Database) | 0-5 m | 1.000 | | |
| | | 5-15 m | 0.750 | | |
| 15-25 m | | 0.500 | | | |
| >25 m | | 0.250 | | | |
| Hydrogeological constraint (Source: Geoscopio) | Present | 1.000 | | | |
| | Absent | 0.500 | | | |
| Protected areas (Source: Geoscopio) | Present | 1.000 | | | |
| | Absent | 0.500 | | | |