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EXPERIMENTATION ABOUT A MAP ON "MARGINAL TERRAINS" WITHIN THE EMILIA-ROMAGNA REGION (ITALY).

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First step: identify marginal terrains

Marginal terrains indicates areas affected by environmental degradation, where no recovery is possible (or economically sustainable) either for manufacturing or residential purposes.
This framework is the result of unfavorable natural features or, more often, of high-impact use change, related to human activities.

Conversely, these areas may be of great interest for the installation of renewable electric power generation systems (RES), as set out by the National Guidelines for the identification of areas suitable for this purpose (2010), also taken into account by the measures recently approved by the Emilia-Romagna Regional Authority.

ENEA required an inventory of selected types of marginal areaswithin E.R. Region to satisfy the aims of an European Project called "M2RES".

Marginal areas can be identified both by economic and environmental point of view, without forgetting the current requirements of reducing to the minimum the soil consumption and the urban sprawl.
Spotting the marginality of a surface is not an easy issue of immediate resolution. Beyond the geographical aspect, an area can be considered “marginal” according to its function.
A land which has no possibility to be immediately used has instead good chances to be tagged as “marginal”.

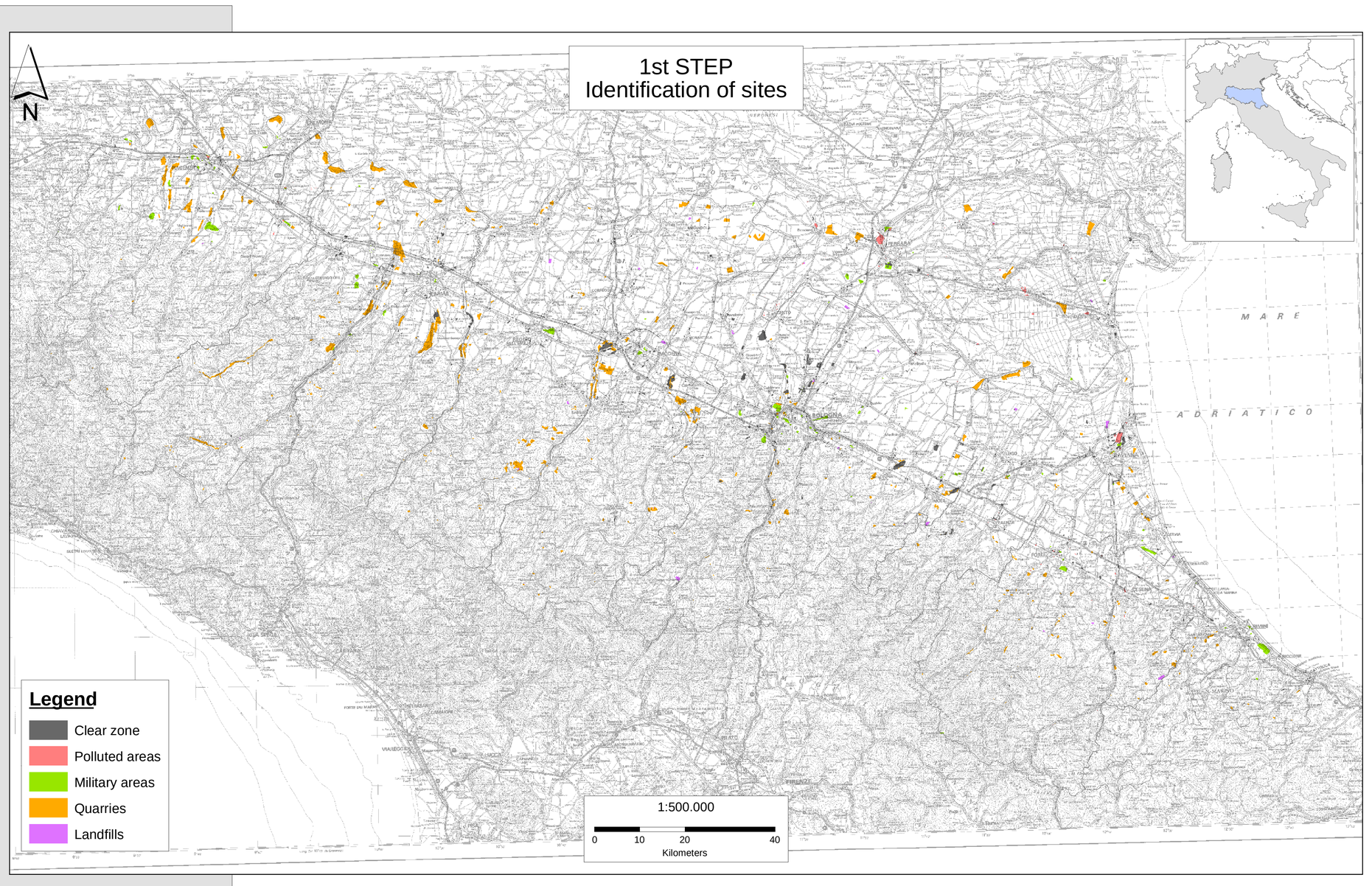
The “marginal”, sterile and “zero value” areas are those that for some reasons have no more benefits for the society or even worse, they are a burden or an environmental problem for the society.

They become “dumps” where often there is a dilemma about what to do once their primary function has been carried out.

The territory and the cartographic description of the marginal areas are not a vacuum or a blank space; they are sometimes well known and well defined by city urban plans.

This is the reason why we it is important to start from the recognition of the local urban systems that allow the identification of the areas, their use and especially their regulatory rules.

The main marginal areas considered in this research and request by ENEA are:
- landfills
- opencast quarries/mines
- former military sites
- brownfield-contaminated terrains that include:
  - polluted areas
  - clear zone



Landfills

Landfills

map coverage:
regional extent

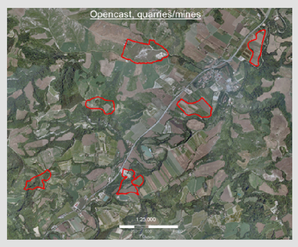
107 total sites identified, pertaining:
- in use
- out of use
- no longer in use
- recovered
- planned

Opencast, quarries/mines

Quarries

map coverage:
regional extent

853 total sites identified, pertaining:
- in use
- out of use
- recovered
- other land use



Military areas

Military areas

map coverage:
regional extent

125 total sites identified, pertaining:
- in use
- out of use
- almost abandoned
- sensible site

Polluted areas

Polluted areas

map coverage:
4 out of 9 provinces

287 total sites identified, pertaining:
- under investigation
- monitored
- recovered

Clear zone

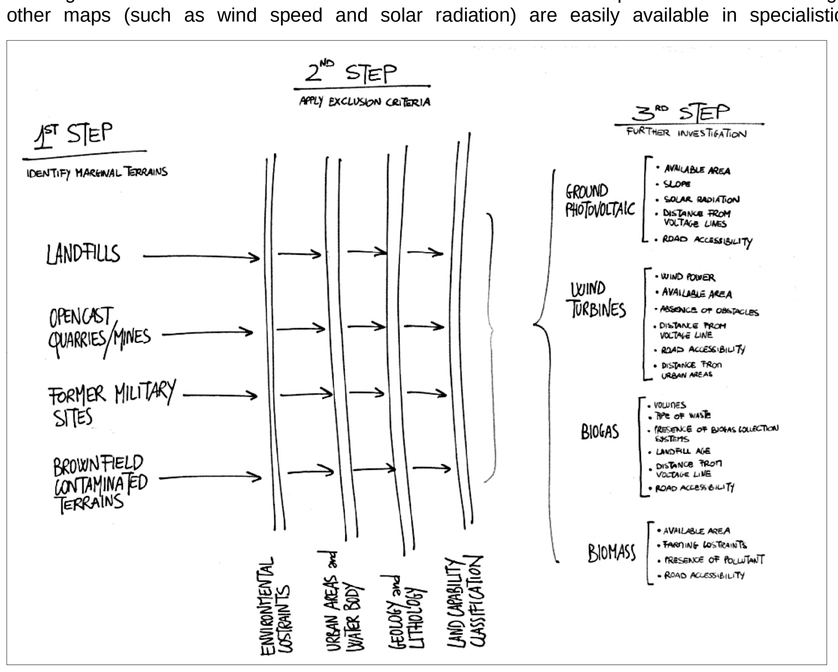
Clear zone

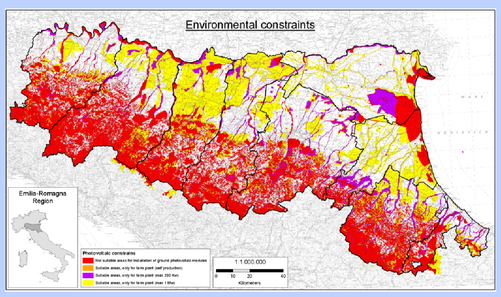
map coverage:
regional extent

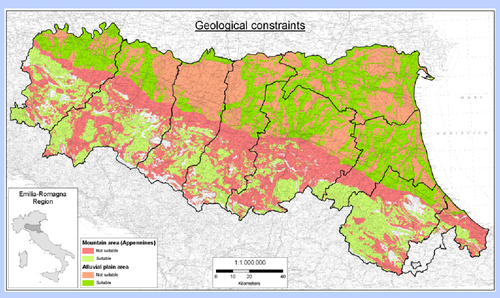
more of 10.000
total sites identified, pertaining:
- infrastructures
- cemeteries
- industrial areas
- detention bacin
- unclassified as urban areas

Third step: applying additional criteria data sources

A third set of data sources deals with further investigations to be performed onto potential RES sites. Some criteria are general (for example road accessibility and distance from voltage lines) although their weight may vary according to the kind of renewable energy source under consideration. Other investigations are really specific to each kind of RES, such as yearly average wind speed, solar radiation, etc.
Here again additional sets of of data sources have been created. In particular road and voltage line maps were digitised too, while other maps (such as wind speed and solar radiation) are easily available in specialistic literature with fairly good detail.

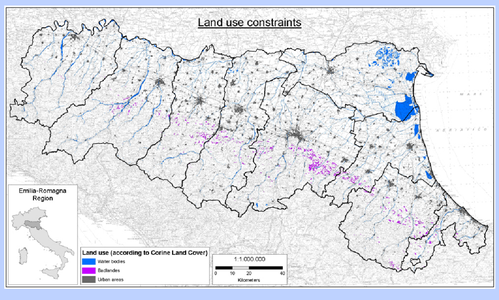


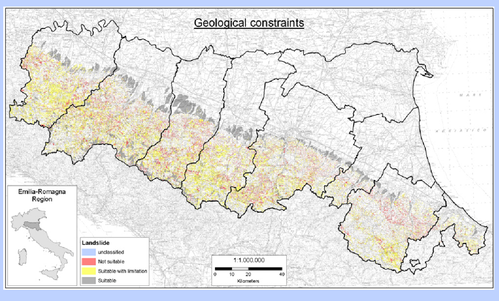


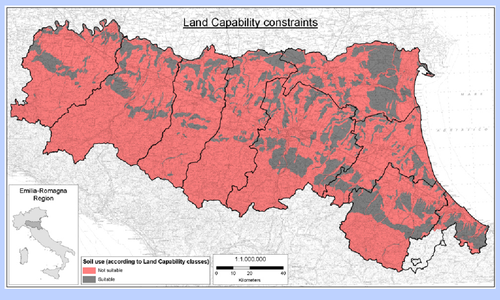


Second step: Definition and application of exclusion criteria

In order to make a first screening of the most suitable sites to create RES project platforms with the implementation of specific technologies, criteria to immediately
exclude a marginal area from the above described lists are identified.
Specific criteria are set for each one of the 5 kinds of areas considered above with reference to the renewable energy.
It should be noted that, at this stage, exclusion criteria must be considered as a set of semi-qualitative parameters, useful to exclude sites that have a no suitability for a specific RES technology.
In this way you can establish a second list showing for each marginal site the assessment of its suitability for hosting some of the foreseen RES plant's technologies.







For simplicity, and for their different significance, four main groups of exclusion criteria have been created:
- Environmental, including recent constraints on RES installation by the Regional legislation board (act n. 28 2010 of the Regional board, that maps suitable regional areas for PV installations, and act n. 51 2011 mapping the areas suitable for wind, biogas, biomasses and hydro installations)
- Land usability i.e. Corine Land Cover classes. These criteria exclude urban areas, water bodies, badlands, in brief all the areas that, for their extrinsic status or use, inhibit RES installations. For the special cases of military sites and clear zones, the urban exclusion has been weakened for obvious reasons.
- Geological constraints: ground/underground suitability (consistency, stability) for RES plants.
This layer excludes unstable areas (landslides, subsiding area, etc.) in wich the ground is not considered strong enough for any kind of stable structure. The elaboration of a final comprehensive stability criterium has been carried out by the Servizio Geologico of the Region on the basis of their already existing sources.
- Land capability e.g. areas suitable for agriculture or to be protected for their environmental value.
This overall criterium comes mainly from the Land Capability classification (SCS-USDA, 1961). The obvious interpretation of this indicator is how much a soil must be safeguarded for its intrinsic value. A whole regional map does not exist in this respect. Here again a first approximation elaboration of other indicators (mainly morphology and climate for flatlands, plus stability and slope for hills and mountains) was prepared in order to obtain a final indicator best approaching the true land capability class.

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