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Revising the JRC/EEA EU-level HNV farmland methodology

Identification of HNV farmland
The Italian experience

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Programming period 2007-2013 – national level

- Impossibility to consistently aggregate indicator values
- Need for a national framework (comparability among Regions)

- In 2014 RRN provided a national framework based on a common method
  - Development of a “national” method following EC Guideline document

HNVF indicator

Common definition of HNVF, no common methodology explicitly provided at EU level – data and methodologies appropriate for each specific situation (biophysical, agricultural, institutional), use of best data available or new data collection

Criteria for identification

1. Land cover
2. Farming systems
3. Species (indicators)

A common typology

Type 1 - Farmland with high proportion of semi-natural vegetation

Type 2 - Farmland with a mosaic of low intensity agriculture and natural and structural elements

Type 3 – Farmland supporting rare species or a high proportion of European or World populations

HNVF indicator

Preliminary identification of the official data sources

Data available at national level (with NUTS2 detail) and updatable

1) Land cover data – Corine Land Cover; national (i.e. LPIS, National Forestry Inventory, AGRIT surey) and regional (land use) databases

2) Farming systems data – National statistical Office (es. Census, Farm Structure Survey (FSS); FADN; IACS data)

3) Data on species/habitat (Ministry of Environments, i.e. *Natura2000 factsheets*; NGOs, i.e. *Common Birds*; regional, local DBs)

type of **data** ⟺ type of approach/method

Land cover approach

*Geografic information system built on a grid of 10*10km (AGRIT)*

Low intensity agriculture and a combination of three indicators:
1) high proportion of semi-natural vegetation;
2) Presence of natural *and semi-natural landscape elements;*
3) presence of European species of conservation interest.

Unit of measurement	*percentage (UAA HNV/total UAA)*
Territorial detail	*Regional (NUTS2; NUTS3 – square 10*10km)*
Frequency	*uncertain – potentially annual (linked to national funding of AGRIT project)*
Sources	*AGRIT – Ministry of agriculture; CorineLandCover; Natura2000 facsheets-MinEnvironment)*

AGRIT data 2010 (Ministry of Agriculture survey):
% Utilized Agricultural Area (UAA)
% land cover classes HNVF
Unit of analysis:
Grid of cells 10 x 10 km (2725 cells cover the whole national territory)

Extracted data
% of AGRIT cell covered by the following *potentially* HNVF land cover classes :
ARABLE CROPS
-rice
-Alfalfa
-temporary meadows
-fallow land or land without crops in place
PERMANENT CROPS
-vineyards
-olive groves
-nut trees
FODDER CROPS
-meadows
-permanent pastures
Family vegetable gardens and orchards annexed to farms

+

Trees outside forest

CORINE Land Cover data
Boundaries of the polygons assigned to Class 3: forests and semi-natural areas (hierarchical level 1)
Minimum mapping:
25 ha

Derived data
Edge lenght of natural and seminatural environments per AGRIT cell

Natura 2000 data
For each SCI/SPA:
-list of species in Habitats Directive (Annex II and IV) associated with HNVF (Paracchini, 2008)
-geographical coordinates of their centroid

Extracted data
Number of species falling into each AGRIT cell

Unit of analysis: AGRIT cell 10 x 10 km
Score: sum of scores (calculated separately for each of the 3 types of HNVF)

type 1
Definition: Farmland with high proportion of seminatural vegetation.
Agricultural land cover classes considered: Meadows and permanent pastures (AGRIT)
Indicator: % land cover (meadows and permanent pastures) on AGRIT cell

type 2
Definition: farmland with a mosaic of low intensity agriculture and natural and semi-natural landscape elements
Agricultural land cover classes considered: Rice, Alfalfa, temporary meadows, fallow land, olive groves, vineyards, nut trees, family vegetable gardens and orchards annexed to farms (AGRIT)
Indicator: Density of trees outside forest (AGRIT) and edge density of natural and seminatural environments (CORINE Land Cover)

type 3
Definition: Species of European conservation interest.
Indicator: Number of species (European list) in SCI/SPA (Natura 2000).

Value of (within the cell)	**Score**
< = first 3 quartiles	1
> third quartile	1 + x/max(x)

Index components

Extent:

Land cover → Selection of land cover classes potentially of low intensity (AGRIT)

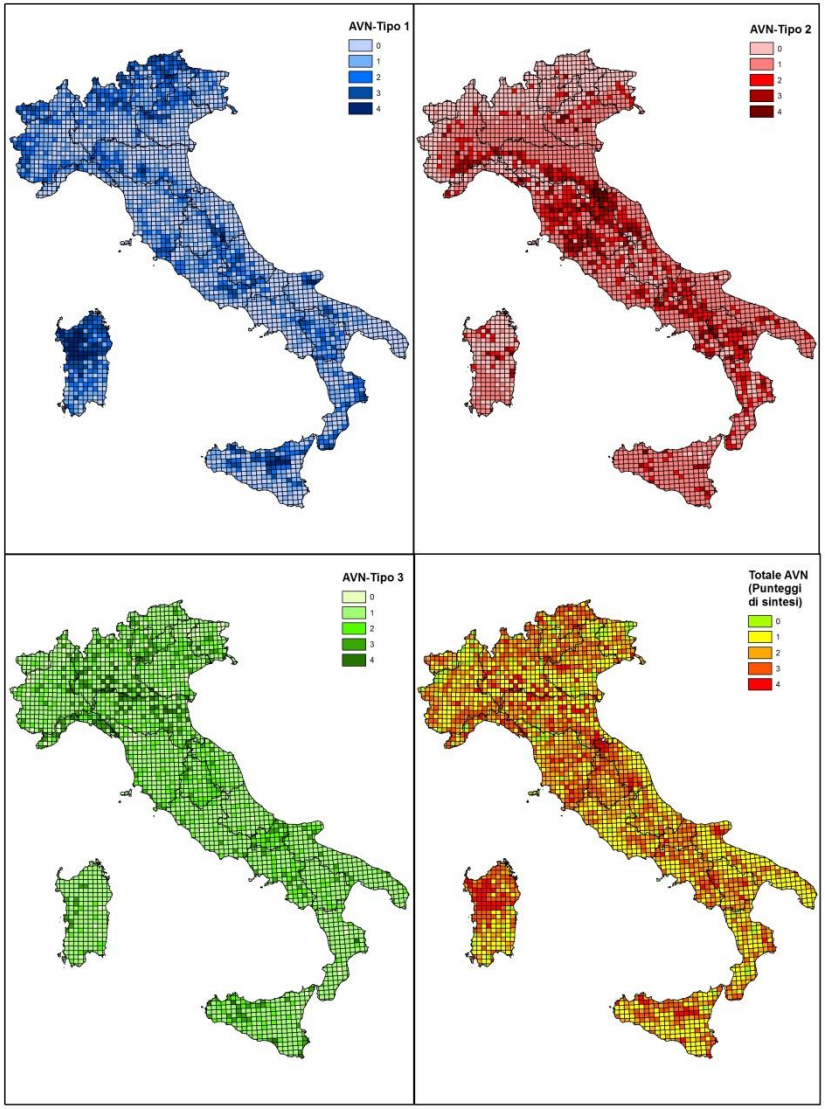
Quality / level of Natural Value

Score according to the following indicators:
Type 1: % meadows and permanent pastures on AGRIT cell

Type 2: Density of trees outside forest (AGRIT) and edge density of natural and seminatural environments (CORINE Land Cover

Type 3: Number of species (European list) in SCI/SPA (Natura 2000)

	HNV - low		HNV - mediium		HNV - high		HNV – very high		HNV -Total		Total UAA
	ha	% SAU	ha	% SAU	ha	% SAU	ha	% SAU	ha	% SAU	ha
Piemonte	218.672	24,1	161.527	17,8	108.875	12,0	12.482	1,4	501.554	55,3	906.348
Valle d'Aosta	8.059	16,3	20.162	40,9	19.623	39,8	-	-	47.844	97,0	49.349
Lombardia	175.893	17,8	92.955	9,4	140.169	14,2	49.543	5,0	458.559	46,4	988.650
P.A. Bolzano	12.764	8,1	33.213	21,1	79.985	50,9	12.048	7,7	138.009	87,8	157.274
P.A. Trento	10.324	11,5	37.396	41,5	24.363	27,1	2.925	3,2	75.009	83,3	90.064
Veneto	113.344	13,3	83.634	9,8	64.621	7,6	11.164	1,3	272.763	32,1	850.277
Friuli Venezia Giulia	36.562	14,5	40.006	15,8	10.268	4,1	3.776	1,5	90.612	35,9	252.482
Liguria	8.897	15,7	14.150	25,0	19.795	35,0	2.864	5,1	45.706	80,7	56.612
Emilia Romagna	170.982	14,8	127.800	11,0	122.721	10,6	56.906	4,9	478.409	41,3	1.158.292
Toscana	124.961	16,3	210.187	27,3	106.038	13,8	19.131	2,5	460.316	59,9	768.598
Umbria	26.079	7,8	96.463	28,9	46.680	14,0	4.484	1,3	173.707	52,0	334.204
Marche	73.180	14,6	58.920	11,8	58.114	11,6	33.379	6,7	223.593	44,6	501.138
Lazio	197.499	29,4	102.317	15,2	46.883	7,0	-	-	346.699	51,6	671.633
Abruzzo	116.400	30,1	82.343	21,3	48.772	12,6	-	-	247.515	64,0	386.622
Molise	9.735	4,7	52.603	25,2	39.122	18,7	3.022	1,4	104.482	50,0	209.064
Campania	78.398	14,0	85.420	15,2	55.907	10,0	7.748	1,4	227.473	40,6	560.879
Puglia	489.542	34,3	80.093	5,6	59.269	4,2	12.088	0,8	640.992	44,9	1.426.586
Basilicata	90.543	17,9	77.010	15,3	41.493	8,2	7.760	1,5	216.806	43,0	504.550
Calabria	171.116	33,5	113.330	22,2	40.199	7,9	9.656	1,9	334.301	65,4	511.081
Sicilia	437.736	30,2	152.297	10,5	171.382	11,8	61.833	4,3	823.247	56,7	1.451.487
Sardegna	105.931	12,2	93.524	10,8	207.933	24,0	199.366	23,0	606.755	70,1	865.057
ITALY	2.676.615	21,1	1.815.350	14,3	1.512.212	11,9	510.175	4,0	6.514.351	51,3	12.700.247



Strenghts

Measurability

- Data adequately documented and of well-kwnown quality
- Data regularly updated/updatable according to reliable procedure.
- Data comparable and measurable along time.

Possibility of integration with other territorial data

Common method ⟹ Comparability among Regions; national value

Relevance for measures designing/monitoring

Concerns farmland ⟹ allows for the identification of territorial priorities

Weaknesses and open questions

- Need of multiple type of data/data sources-providers
- Frequency of updating/ (uncertainty due to financial resources constraints)
- No links to farms
- Level of geographical detail of results (Possible need of further regional effort)

Land cover estimates available for the AGRIT cells derive from sample surveys, not allowing a precise localization of land covers classes. The latter requires a further detailed territorial characterisation based on spatially referenced data possibly available at regional level)

- Estimates mainly based on agricultural statistics:

Farmland «potentially" HNV ⟹ further in-depth analysis on biodiversity worthwhile

Programming period 2014-2020 – national level

- CI 37 http://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/13563

  Data base on context indicators provided by the RRN
  http://www.reterurale.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/12112

- Same approach (land cover approach), but refinement of method, trying to overcome some weaknesses: new attributes (land cover) and new biodiversity data
  - Linkage of land cover data with farm data/RDPs farms
  - Higher level of territorial detail (grid with square units of 2x2 km)
  - Use of information available from IACS
  - Progress towards HNVF Impact indicator

- Pilot project - Piedmont region

Pilot project (Piedmont Region)

The project aims at building a specific database (agricultural territorial information) supporting the identification of HNV farmland.

The database is:

- based on the integration of administrative and territorial data stored in the SIAN (National Agriculture Informative System), and particularly (IACS – LPIS- AGRIT)
- enriched with **qualitative** information collected through field survey on sample points statistically selected.

Steps of project

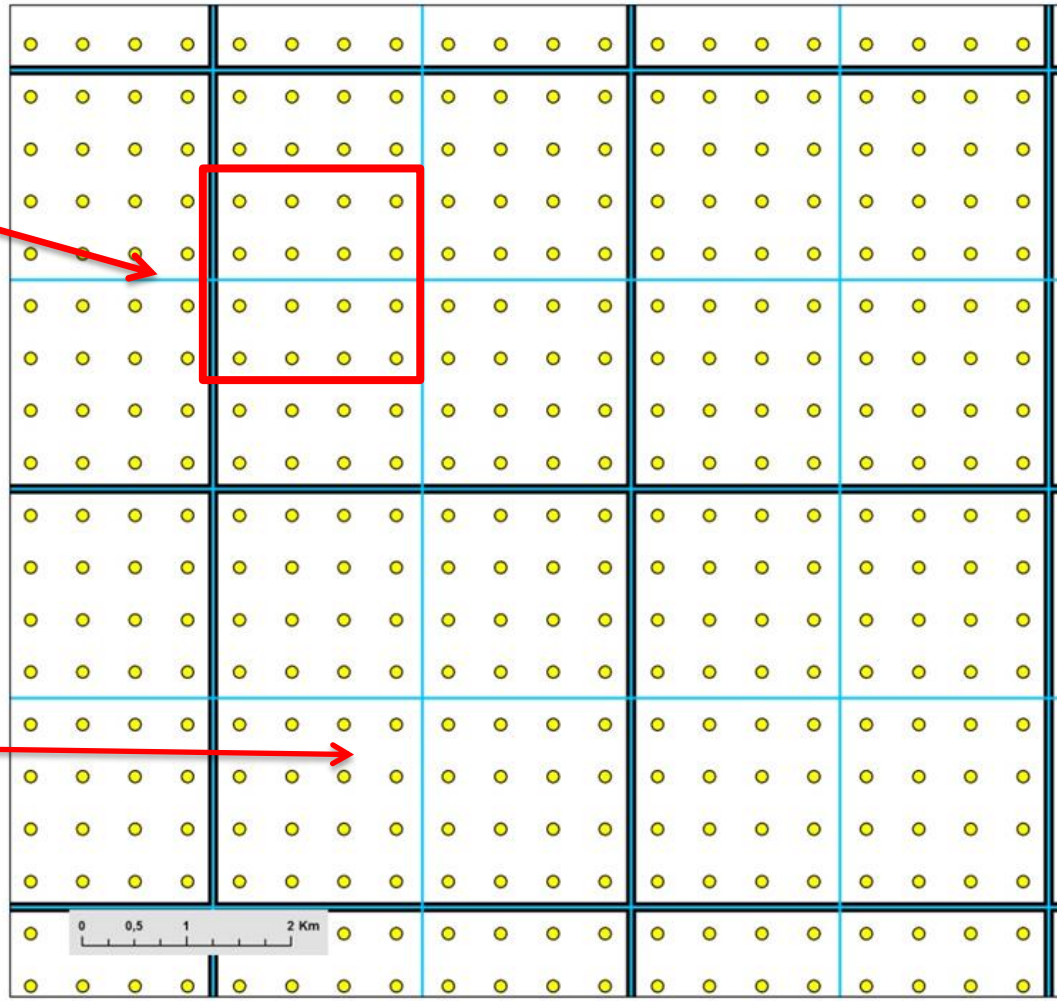
The project is based on the following steps :

1. Structuring the reference grid linked with the AGRIT sampling frame;
2. Shaping the spatial data bases on each unit of the square grid;
3. Defining the data set for territorial characterization;
4. Classification and stratification of each unit of the grid (and frame points);
5. Field surveys;
6. Statistical elaborations on intensity of farming and landscape attributes.
7. Selection of «potential» HNV farmland

Structuring the reference grid

The grid is defined by square units.
Each square unit of the grid is 2 km x 2 km.

16 AGRIT points are comprised in each square unit.



Shaping the spatial data bases on the square grid (1)

SIAN's databases used for integration were:

- **Land cover layer – refresh project:** photo-interpretation data of the whole national territory (300.000 sq.km) photo-interpretation is not limited to the parcels declared for subsidies application but photo-interpretation of artificial, natural and forestry is included.
- **EFA layer**: landscape features detected by photo interpretation;
- **Farm register data:** (farm crops, farmer's age etc.)
- **RDP applications**: type of measures by farm and associated areas (data provided by the Piedmont Region);
- **Territorial and administrative data** (Natura 2000 areas, etc ...).

Shaping the spatial data bases on the square grid (2)

The refresh data are overlapped on the grid enabling the definition of different land cover polygons for each unit of the grid.

Subsequently cadastral parcels falling in the agricultural polygons are identified, allowing the identification of farms

Accessing the farm register enables to associate the cultivated crop to each parcel

As result for each unit you obtain the :

- LC area (possibly detailed at register level)

Shaping the spatial data bases on the square grid (3)

ID Tassello	Dati catastali			Dato "Refresh" Land Cover data (LPIS)			Dati fascicolo Farm register data				
Codice tassello	Codice Naz. Comune	Foglio	Particella	Cod. Varietà Refresh	Descrizione varietà	Superficie (ha)	Codice Utilizzo da Fascicolo	Descrizione utilizzo	% Copertura	Superficie ripartita	Domanda PSR Misura
15531_A	F707	11	00010	666	SEMINATIVO DA FOTOINTERPRETAZIONE	35.63	019	RISONE	98.70	35.17	10.1.1
15531_A	F707	12	00001	666	SEMINATIVO DA FOTOINTERPRETAZIONE	26.29	019	RISONE	97.90	25.74	10.1.1
15531_A	F707	12	00002	666	SEMINATIVO DA FOTOINTERPRETAZIONE	22.97	019	RISONE	97.70	22.44	10.1.1
15531_A	N265	6	00001	666	SEMINATIVO DA FOTOINTERPRETAZIONE	14.72	019	RISONE	100.00	14.72	10.1.1
15531_A	L429	67	00097	666	SEMINATIVO DA FOTOINTERPRETAZIONE	12.63	019	RISONE	100.00	12.63	
15531_A				321	INFRASTRUTTURE DI TRASPORTO	10.89				10.89	
15531_A	F707	13	00007	666	SEMINATIVO DA FOTOINTERPRETAZIONE	10.38	019	RISONE	99.90	10.36	10.1.1
15531_A				329	CORSI D'ACQUA, CANALI E IDROVIE	9.24				9.24	
15531_A				786	FOSSI E CANALI DI LARGHEZZA INFERIORE A 10 M.	9.07				9.07	
15531_A	N265	6	00015	666	SEMINATIVO DA FOTOINTERPRETAZIONE	7.72	019	RISONE	100.00	7.72	10.1.1
15531_A	F707	10	00006	666	SEMINATIVO DA FOTOINTERPRETAZIONE	7.64	019	RISONE	100.00	7.64	10.1.1
15531_A	F707	10	00005	666	SEMINATIVO DA FOTOINTERPRETAZIONE	7.85	019	RISONE	96.40	7.57	10.1.1
15531_A	N265	6	00003	666	SEMINATIVO DA FOTOINTERPRETAZIONE	7.56	019	RISONE	100.00	7.56	10.1.1
15531_A	L429	66	00204	666	SEMINATIVO DA FOTOINTERPRETAZIONE	7.28	019	RISONE	100.00	7.28	
15531_A	N265	6	00019	666	SEMINATIVO DA FOTOINTERPRETAZIONE	6.39	019	RISONE	98.80	6.31	10.1.1
15531_A				318	FABBRICATI ISOLATI	6.22				6.22	
15531_A	F707	10	00008	666	SEMINATIVO DA FOTOINTERPRETAZIONE	5.94	019	RISONE	100.00	5.94	10.1.1
15531_A	F707	12	00003	666	SEMINATIVO DA FOTOINTERPRETAZIONE	5.85	019	RISONE	100.00	5.85	10.1.1
15531_A				300	BOSCHI DI LATIFOGLIE	5.63				5.63	
15531_A	N265	6	00027	666	SEMINATIVO DA FOTOINTERPRETAZIONE	4.80	019	RISONE	100.00	4.80	10.1.1

Defining the data set for territorial characterization (1)

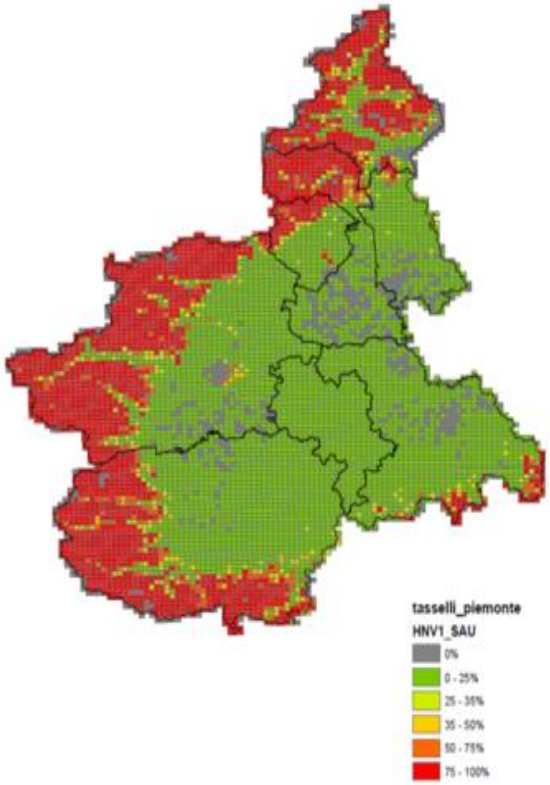
The characterization is aimed at providing an overview of the units according to different parameters and for the subsequent assignment of HNV probability to each square units .

To select the units, LC types were aggregated by large classes.

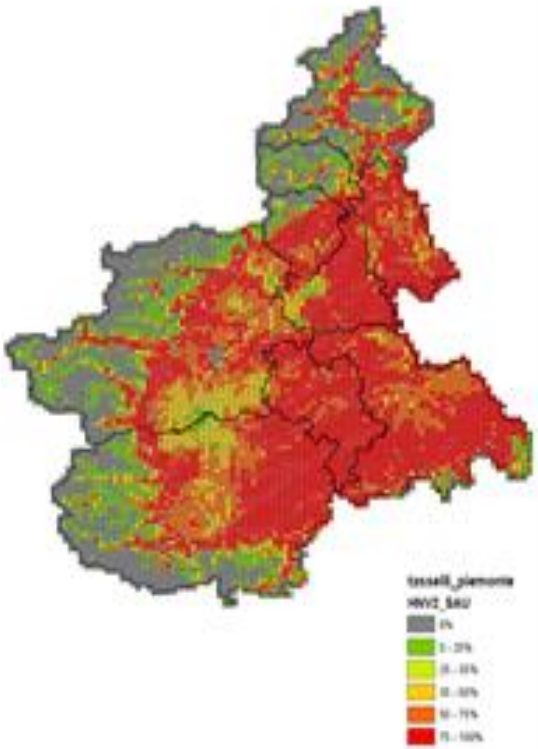
Afterwards LC aggregations are associated with a HNV level of probability

- ✓ Low probability of HNV
- ✓ Unknown probability HNV
- ✓ High probability of HNV

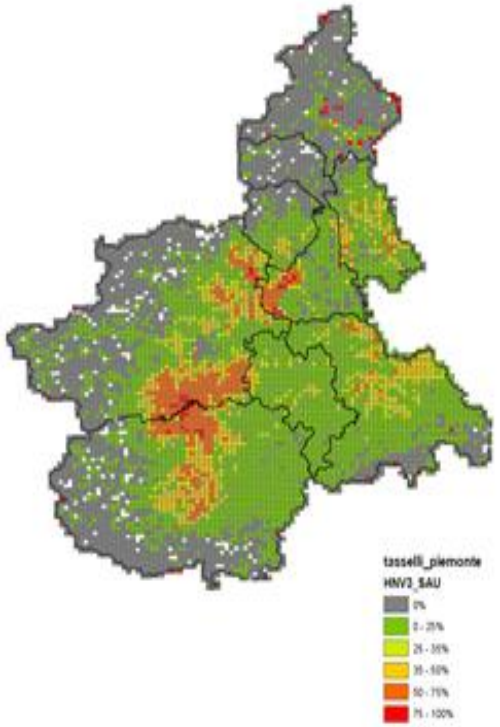
Defining the data set for territorial characterization (2)



Distribution of LC classes with high probability to be HNV

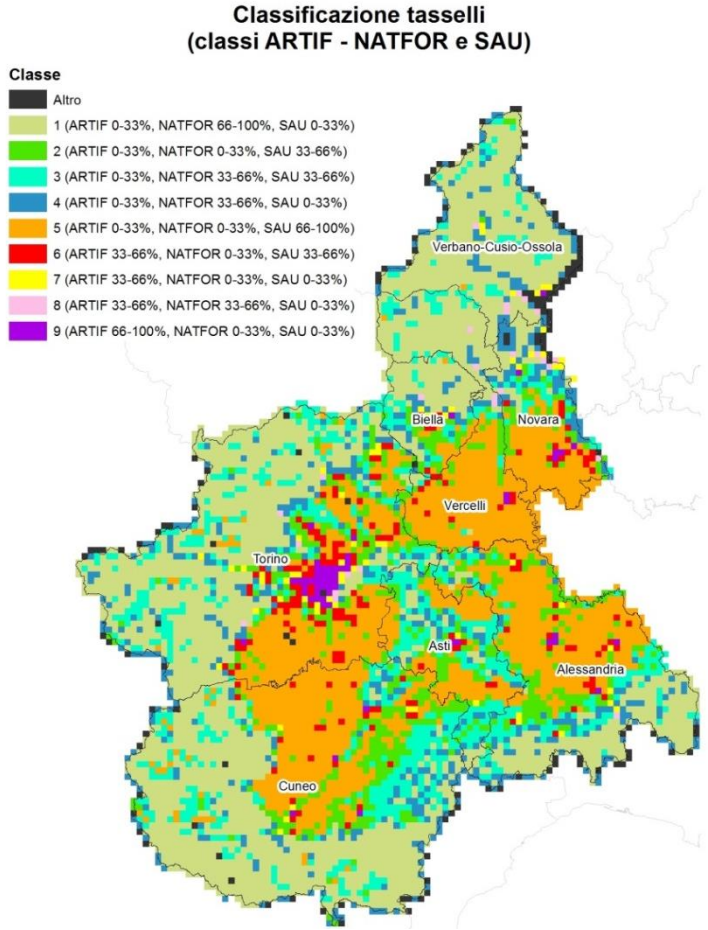


Distribution of LC classes with uncertain probability to be HNV



Distribution of LC classes with low probability to be HNV

Defining the data set for territorial characterization (3)



Classe tassello	ARTIF		NATFOR		SAU	
	da	*a*	*da*	*a*	*da*	*a*
1	0	33	66	100	0	33
2	0	33	0	33	33	66
3	0	33	33	66	33	66
4	0	33	33	66	0	33
5	0	33	0	33	66	100
6	33	66	0	33	33	66
7	33	66	0	33	0	33
8	33	66	33	66	0	33
9	66	100	0	33	0	33

Classification and stratification of each unit of the grid and frame points (1)

In order to select the sample points to be field checked each square unit (unit) is classified with the following parameters:

Category A: units where the percentage of artificial areas is greater than 33%**;**

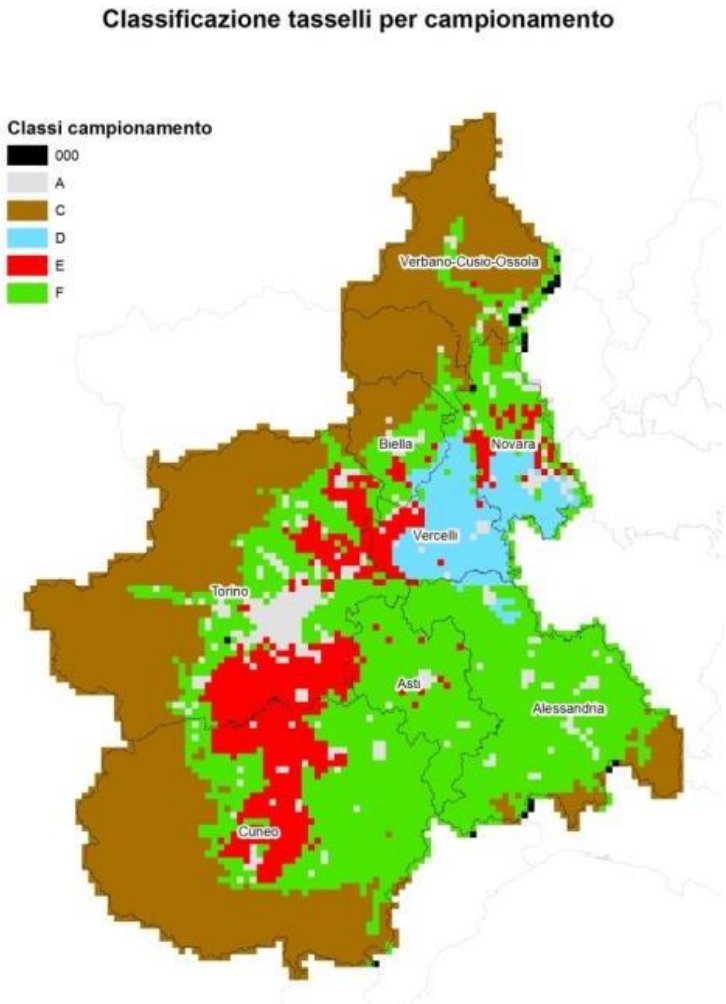
Category C: units above an elevation where there is "a substantial dominance of HNV areas" (elevation established by the Piedmont Region)**;**

Category D: units where rice fields % is greater than 33%**;**

Category E: units where the percentage of No-HNV (HNVN) land is greater than 33%**;**

Category F: units where the percentage of No-HNV (HNVN) land is less than 33%.

Classification and stratification of each unit of the grid and frame points(2)



Units are sampled for field survey

Category D: rice fields % is greater than 33%;

Category F: % of No-HNV (HNVN) land is less than 33%

Statistical sample

PROV.		Totale punti strati 1,2,3 e 5 per Tasselli categoria D ed F	Strato 1	Strato 2	Strato 3	Strato 5	TOT Campione	% su punti strati 1,2,3 e 5 per Tasselli categoria D ed F
1	Torino	2 929	802	113	63	130	**1 108**	*38%*
2	Vercelli	3 462	672	38	20	30	**760**	*22%*
3	Novara	2 292	510	35	25	35	**605**	*26%*
4	Cuneo	5 646	1 171	745	77	189	**2 182**	*39%*
5	Asti	3 351	656	398	95	96	**1 245**	*37%*
6	Alessandria	7 712	2 176	456	97	188	**2 917**	*38%*
96	Biella	630	148	17	19	12	**196**	*31%*
103	Verbania	120	15	2	11	8	**36**	*30%*
	Totale	**26 142**	**6 150**	**1 804**	**407**	**688**	**9 049**	*35%*

Information collected by field surveys

focus on intensity of farming and naturality

All Land Cover classes

Presence of terraces

Arable crops, permanet crops, meadows

Presence of irrigation

Presence of unfarmed features (dry stonewalls, hedgerows, row of trees)

Permanent crops

Green cover (>50 cm)

Tree density (regularity)

Management conditions (managed/abandoned)

Ploughing or other signs of cultivation

Meadows and permanent pastures

Absence of cultivated species (i.e. alfalfa, etc)

Rice fields

Presence of field margins

Presence of ditches within the peddy field

Statistical elaborations of survey data

For each square unit: land cover types qualified by combinations of landscape and farming intensity attributes .

Selection of «potential» HNV farmland

First selection of potential HNV farmland based on criteria related to land cover types associated to combinations of landscape and farming intensity attributes

Further steps

Integration with biodiversity data (in collaboration with the Ministry of Environment, Birdlife Italy (LIPU)

- Spatialised data on species and habitats (Natura 2000) from the 3° National Report
- Meadows and permanent grassland species
- Farmland birds

Farming system approach

- Identification of main farming systems, trough the combination of land use features and presence of livestock
- Selection of HNV farming systems based on indicators related to two dimensions (intensity of farming and biodiversity): livestock density, irrigated area, organic area, crop rotation, unfarmed features, set aside area, presence of cover crops

Unit of measurement	*percentage (UAA HNV/total UAA)*
Territorial detail	*Regional (NUTS2) and Municipality*
Frequency	*10 years (possibility of more frequent updating based on FSS if relevant variable included)*
Sources	*Agricultural Census 2010 (Istat)*

Type of farming systems

(size of livestock – land use)

Livestock

(> 2 LU)

Livestock perm meadows > 50% UAA

Livestock and crops perm meadows < 50% UAA

Crops (≤ 2 LU)

Arable crops arable crops > 50% UAA

Perm. Crops perm. crops > 50% UAA

Perm meadows perm meadows > 50% UAA

Mixed crops arable crops ≤ 50% UAA
perm meadows ≤ 50% UAA
perm crops ≤ 50% UAA

Livestock	HNV livestock
LU > 2 Meadows and pastures > 50% UAA.	LU herbivorous ≥ 2 LU not herbivorous < 2 Irrigated area = 0, Livestock density ≤ 0,5/0,75/1 (mountain/hill/lowland respectively).
Meadows and pastures	**HNV meadows and pastures**
Total LU≤ 2, Meadows and pastures > 50% UAA.	Irrigated area = 0, Livestock density ≤ 0,5/0,75/1 (mountain/hill/lowland respectively).
Arable crops	**HNV arable crops**
Total LU ≤ 2, Arable crops > 50% UAA.	➢ Irrigated area ≤ 10% UAA, ➢ crop rotation > 50% UAA **Additional HNV criteria** ➢ organic area > 70% UAA. *Or at least two of the following conditions:* ➢ presence of unfarmed features, set aside ≥10% UAA, presence of cover crops > 50% UAA.

Permanent crops	HNV permanent crops
Total LU ≤ 2, **Permanent crops > 50%UAA.**	➢ Irrigated area = 0, **Additional HNV criteria** ➢ organic farming > 50% UAA. *Or at least two of the following conditions:* ➢ Presence of unfarmed features, presence of cover crops, presence of not irrigated olive groves.
Mixed crops	**HNV mixed crops**
Total LU ≤ 2, **Arable crops ≤ 50% UAA, permanent meadows and pastures ≤ 50% UAA , permanent crops ≤ 50% UAA.**	➢ Irrigated area ≤ 10% UAA, **Additional HNV criteria** ➢ organic farming ≥ 70% UAA. *Or at least two of the following conditions:* ➢ Presence of unfarmed features, set aside ≥ 10% UAA, presence of cover crops, crop rotation > 50% UAA, presence of not irrigated olive groves.
Livestock and crops	**HNV livestock and crops**
LU >2 **Permanent meadows and pastures < 50% UAA.**	➢ LU herbivourous ≥ 2 ➢ LU not herbivourous ≤ 2 ➢ Irrigated area ≤ 10% della SAU ➢ Livestock density≤ 0,5/0,75/1 (mountain/hill/lowland respectively). **Additional HNV criteria** ➢ organic farming ≥ 70% UAA. *Or at least two of the following conditions:* ➢ Presence of unfarmed features, set aside ≥ 10% UAA, presence of cover crops, crop rotation > 50% UAA, presence of not irrigated olive groves.

HNV farming systems

	N° of Farms	Total UAA	Maen UAA	% su N° Farms Total	% on Total UAA
Non-HNV	1403399	9.793.904,15	6,98	86,58%	76,18%
HNV - Livestock	17.228	1.077.919,49	62,57	1,06%	8,38%
HNV - Livestock & Crops	5.494	185.067,86	33,69	0,34%	1,44%
HNV – Arable crops	26.814	339.469,81	12,66	1,65%	2,64%
HNV – Permanent crops	105.164	321.151,26	3,05	6,49%	2,50%
HNV – Medows and pastures	55.064	1.099.752,93	19,97	3,40%	8,55%
HNV – Mixed Crops	7.721	38.782,32	5,02	0,48%	0,30%
HNV - TOTAL	217.485	3.062.143,67	-	13,42%	23,82%
TOTALE (HNV + NonHNV)	**1.620.884**	**12.856.047,82**	**-**	**100%**	**100%**

Source: *Agricultural census data 2010 (ISTAT).*

Strenghts

Measurability

- Data adequately documented and of well-kwnown quality
- Data regularly updated according to reliable procedures.
- Data comparable and measurable along time.

Relevance for measures designing/monitoring

Concerns farming systems
Based on farm variables
Describes farmer behaviour

definition of eligibility criteria

Weaknesses and open questions

Data NOT easily available

Trend (comparability Census- Farm Structure Survey)

Estimates based on agricultural statistics:
«potentially» HNV farmland → further in-depth analysis on biodiversity/data integration worthwhile

Not spatially referenced (information at administrative unit level)

Some … not concluding … remarks

- Complex indicator
  - many actors (i.e. data providers) → many possible constraints
  - Resource consuming
- Importance of the *governance* of national information system
- Important to build on and/or enhance existing experiences/datasets
- Crucial role for IACS data
- Role of financial support in the updating of data/indicators
- Need of MAs awareness (data needs, studies)
- Instability of indicator values in case of changes of methodologies/new data (trends vs more accurate estimates)

Use of HNV indicator: context vs design/monitoring of RDPs interventions (sensitiveness to RDPs interventions)

Figures vs detailed maps land/farming characteristics


Thank you for your attention
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