|  |  |  |
| --- | --- | --- |
| Sector/ TOPIC: AgricUlture  Components: Soil (Land Use) | | |
| *TITLE: Monitoring scheme for the assessment of the Ecosystem based and Integrated Coastal Zone Management in the “Gulf of corigliano” pilot AREA APPLIED to Agriculture driver* | | |
| tARGET AREA  “Gulf of Corigliano” as project area defined in Med4EBM project and the Lake Tarsia and Crati river Reserves | | |
| frequency  USUALLY, the collection of data selected for the building of the indicator framework from Regional Agencies for the protection of the Environment and regional administration is implemented annually | | |
| **MONITORING RATIONALE (System Component)** | | Agriculture is one of the two main economic drivers of the project area and, in general, of the Piana di Sibari. Just as in the case of tourism, the area bases a large part of its economy on agriculture, an activity that generates income and offers job opportunities, but at the same time produces non-negligible impacts on the environment.  Among these, the use of large quantities of water for irrigation, which risks to cause phenomena such as the entry of the salt wedge. The widespread use of chemical products, including fertilizers, increases the probability of pollution from runoff which can lead to an increase in eutrophic phenomena on the network itself and on the coastal marine belt, and a potential human health hazard. Polychlorinated biphenyl (PCB) “pollution related to the use of organic waste as fertilizers in agricultural soils is a cause of major concern” (Antolín-Rodríguez et al 2016).  Investigations carried out both on shellfish in the Corigliano Calabro area, to assess the impact of an environment potentially contaminated by anthropogenic activities, highlighted the presence of PCBs. Moreover, among the pesticides, p,p'DDE was detected, the presence of the parent compound, p,p'DDT was also found in less than half of the samples (Mancuso et al 2015) |
| **MONITORING GOAL** | | The monitoring plan has an objective that we could define as a scenario, which is to keep the overall impact of the sector under control with respect to the ecosystem of the area and that represented by the reserve. This is declined in a series of specific objectives that want to keep the attention on:  a) the overall evolution of the –farmland in terms of general surface area, intensity of application of organic crops  b) the pressure that is exerted on the water resource  c) the use of chemistry in agriculture. |
| **LABORATORY ANALYSIS NEEDS** | |  |
| **Data Analysis and interpretation protocols** | | The proposed monitoring system was identified on the basis of the criterion of technical and economic sustainability over the medium-long term. This is obtained from the use of data deriving from a series of official surveys which are carried out by various institutional subjects and which feed the official reporting on the topic.  The identification and use of the system of agro-environmental indicators has made it possible to include, on the one hand, this monitoring system in a comparable and reproducible reference context, even on territorial scales and in ecosystem contexts different from that of the project. Furthermore, from an interpretative point of view, the reference to this system of indicators allowed us to work in a context of consolidated semantic and functional interpretation., The work pattern proposed for this driver places the relationship with stakeholders at the centre of the activities. The consolidation of this involved the sharing of the SCEA (System Cause Effect Analysis) and possible intervention and management measures. To make these operational, a series of meetings are planned to define the implementation and start a work of reconnaissance of financing possibilities on local (regional), national and community programming. In this sense, it is also considered interesting to monitor the implementation path of the "Crati River Contract" which could contain interesting synergies both in terms of implementation of monitoring and activation of specific actions. The proposed set of indicators (which identifies the data to be collected and organized on ISP) is the one on which further analysis must be developed in order to verify whether the proposed measures have effects on the environmental matrices identified as sensitive. This is also in consideration of the fact that for some specific matrices the analyses that are foreseen under the law (i.e. surface waters) require an overall ecosystem reading (ecological state and chemical state of the waterways). |
| DSS System Diagram & INDICATORS | | |
| **DIAGRAM ELEMENT: Agriculture / Soil (Land Use)**  **Hydrography and quality of water**   |  |  |  | | --- | --- | --- | | **Indicator** | **Information and data** | **Description** | | Utilized Agricultural Area (UAA) | **ISTAT, National Agricultural Census**  The 7th General Census of Agriculture finds its normative source, at European level, in the Regulation (EU) 2018/1091 of the European Parliament and of the Council of 18 July 2018 relating to integrated statistics on companies agriculture (which repeals Regulations (EC) No. 1166/2008 and (EU) No. 1337/2011), which ordered the implementation by part of all the Member States and indicated the procedures for carrying it out, emphasizing its obligatory nature, as well as in Commission Implementing Regulation (EU) 2018/1874 of 29 November 2018 on the data to be submitted for the year 2020 in accordance with Regulation (EU) 2018/1091 of the European Parliament and of the Council of 18 July 2018 mentioned above, regarding the list of variables and their description.  The survey unit of the Census is the agricultural and livestock holding as defined by regulation (EU) 2018/1091 (art. 2 paragraph a): single technical-economic unit subject to unitary management which it carries out, as a primary activity or secondary, agricultural activities within the meaning of regulation (EC) n. 1893/2006. | The indicator identifies the utilized agricultural area with municipal details, the information it is able to provide concerns an initial quantitative assessment of what the municipal area is affected by crops. It is also the first direct indication of how relevant this important economic driver is in terms of land use and, indirectly, what could be the impacts linked to agriculture, in terms of needs irrigation, and the eutrophication of the hydrographic network. The project area is a strong zone agricultural characterization, being the plain of Sibari the largest plain of the region. | | Share of main agricultural land types in UAA (%) | As indicator for UAA | This indicator is useful for specifying the composition and weight of the various categories of crops that make up the UAA. In the context of the Community agricultural policy glossary, at the basis of the statistical survey of the General Census of Agriculture, it is defined from all the land invested in arable land, woody agricultural crops, family gardens and meadows permanent and pastures | | Agricultural area cultivated with organic farming (OFA) | As indicator for UAA | The indicator identifies the agricultural area cultivated according to organic farming methods and techniques. Organic agriculture can be interpreted, also in terms of understanding the potential ecosystem services provided, as a production system that places emphasis on environmental protection and animal welfare by reducing or eliminating the use of synthetic chemical inputs , such as fertilizers and pesticides. The focus is therefore placed on the promotion of crop and agro-ecosystem management practices for crop production and livestock breeding. | | Share of organic agricultural area on utilized agricultural area (%) | As indicator for UAA | The indicator, closely related to the previous one, identifies the sum of the surfaces cultivated with organic methods (SAB) and of the areas undergoing conversion in proportion to total utilized agricultural area (UAA). The indicator expresses the importance, in the context of  surfaces identified as agricultural productive surfaces, of that part which works in such a way as to reduce potential impacts, making the most of the ecosystem services of the area and, at the same time, contributing to their development. | | Quantities (qls) of fertilizers distributed for agricultural use | The survey on the distribution of fertilizers for agricultural use is an annual census survey, implemented by ISTAT, which detects the quantities of fertilizers produced or imported which have been distributed by individual companies, under their own brand or with foreign brands, in each province. The supply of the data required by 'Istat is mandatory pursuant to art. 7 of the legislative decree n. 322/1989 and of the Presidential Decree of 15 December 2022, approving the 2020-2022 National Statistical Programme, 2021-2022 update and the attached list of surveys which imply the obligation to respond for private subjects; in the event of no response, no fine will be applied. | The indicator provides the quantities of fertilizers distributed, not the quantities used by farmers. It is an indicator of the potential of the agroecosystem in terms of contribution to an action of eutrophication of the superficial hydrographic network and of the coastal marine belt. The quantities of fertilizers (N and P) are therefore indirectly linked to this type of impact e its evolution is an indication of how the agricultural production system of the area is oriented towards a reduction in the contributions of chemicals, favouring actions that exploit natural fertility of soils. | | Quantities (kgs) of pesticides distributed for agricultural use | The survey on the use of plant protection products in agricultural crops is carried out in accordance with the provisions of EC Regulation no. 1185/2009 of the European Parliament and of the Council, in order to have data on the use of pesticides in agriculture. The survey includes two annual sample surveys, in which farms are asked to indicate the use of plant protection products in the two agricultural crops selected for the reference year. The surveys are sample-based and the reference universes come from the Register of farms (farms that cultivate the two selected crops). Since 2014, in relation to the purposes indicated in the National Action Plan on the sustainable use of plant protection products, the number of crops identified has increased from one to two per year within a group of 5: vines, durum wheat, tomato, potato, corn. The choice of crops took into account both the diffusion on the national territory and the quantity and type of active substances used (e.g. corn for herbicides, vine for fungicides and copper in particular, etc.). | The indicator provides the quantities of plant protection products distributed (supply side). It identifies the quantity of chemical products (pesticides) distributed per surface. Its tracking constitutes an indication of how the agricultural production system of the area is oriented towards one reduction of chemical inputs, favouring actions that exploit ecosystem services in terms of the possibility of reducing the need for such contributions, favouring diversity and resilience of the agroecosystem with respect to various pathologies. | | Share of irrigated area on UAA (%) | As indicator for UAA | The irrigation needs of the project area were linked during the analysis ecosystem, as well as direct pressure on surface water reserves (irrigation by withdrawal from watercourses) and underground (irrigation from wells), to some reported impacts by stakeholders. Among these, the main phenomenon is that of the ingression of the salt wedge into the coastal areas of the cultivated belts. | | Share of farms using the different irrigation methods | As indicator for UAA | The indicator divides the farms on the territory according to the various irrigation systems used, like this how ISTAT classifies them for statistical accounting purposes. 41% of companies use the micro-irrigation, 30% sprinkling (rain) and 26% the surface flowing technique and lateral infiltration. Submersion, a practice used for rice cultivation, is only used in 1% of the companies in the project area. During the cause-and-effect analysis, even more was considered effective to implement an indicator that does not take into account the number of companies but rather of their real size, therefore of the utilized agricultural area. In this way, starting from assumption that the choice of one method rather than another depends on many factors, among which the type of crop, the water availability and the morphology of the land, it is possible to evaluate more accurate any stress exerted by agricultural practices on water resources. |   [AGRICOLTURA (Id=1961)]   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Indicators attached to component: AGRICOLTURA (Id=1961)** | | | | | | **Name** | **Description** | **DataSource** | **Update Frequency** | **Notes** | | Ingressione Cuneo Salino | Cloruri  Conducibilità | ARPACAL (verificare) |  |  | | Aziende Agricole |  | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni |  | | % SAB su SAU | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni | Query | | % SAU irrigata | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni | Query | | % SAU su Superficie Comunale | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni | NB: Considerare solo il 2010 in quanto è stata utilizzata la superficie comunale al 2010. Negli anni precedenti ci sono state delle variazioni dei confini (ad esempio un ridimensionamento di Trebisacce per cui vengono percentuali di SAU superiori al 100% della superficie totale nel 1982). | | % SAT su Superficie Comunale | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni | NB: Considerare solo il 2010 in quanto è stata utilizzata la superficie comunale al 2010. Negli anni precedenti ci sono state delle variazioni dei confini (ad esempio un ridimensionamento di Trebisacce per cui vengono percentuali di SAT superiori al 100% della superficie totale nel 1982). | | Numero di Aziende Agrituristiche | Indicatore | ISTAT | 1 Anno |  | | % Categorie SAU su SAU | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni |  | | % SAU per Tipologia di Sistema Irrigazione | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni | Molto simile all'indicatore "% SAU irrigata", qui viene solo dettagliata la tipologia. | | % Numero Aziende Agricole per Tipologia di Sistema Irrigazione | Indicatore | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni |  |   [Superficie Agricola Totale (SAT) (Id=2019)]   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Indicators attached to component: Superficie Agricola Totale (SAT) (Id=2019)** | | | | | | **Name** | **Description** | **DataSource** | **UpdateFrequency** | **Notes** | | SAT - Superficie Agricola Totale | -Tipologia  -Totale | ISTAT - Censimento Generale dell'Agricoltura | 10 Anni |  | | | |
| Data Collection Procedure | | |
| Staff | The staff involved in the application and maintenance of this monitoring protocol will work on two levels:  1) a local level (located at the Natural Reserves of Tarsia Lake and the Crati River) which will be responsible for verifying, updating and refine the databases also using consolidated relationships with some particularly qualified stakeholders for the collection of databases pertaining to the topic (ARSAC and ARPACAL)  2) a national level of management, updating and maintenance of the DSS - ISP system which will be managed by Amici della Terra - Rome.  The human resources identified for this management model will be Agostino Brusco, Director of Reserves, Manrico Benelli and Matteo Onori for analysis, database management and feeding of DSS - ISP and Donovan Baldassarri for general project management. | |
| Equipment | The monitoring protocol has its own characteristics and specificities which lead us to essentially define two categories of "equipment" necessary for its application:  1 – local and central human resources for the work of collecting, analysing and entering data into the DSS – ISP system  2 – the hardware resources required to develop these operations.  With respect to the first category, the following figures can be identified:  1 local monitoring manager, physically located at the secretariat of the Mediterranean Forum, who will be in charge of managing and consolidating the network of relationships with local stakeholders, processing requests for updated data on the various DBs and organizing them for sending to the headquarters of management of the DSS - ISP.  1 central monitoring manager, physically located at the association's headquarters in Rome, who will be in charge of managing the collection of data sent from remote and providing for initial archiving and organization.  1 central thematic expert, functionally located at the association's headquarters in Rome, who will be responsible of analysing the DBs and data packets received, processing information summaries, highlighting any information gaps. The CTE will functionally collaborate with the central DB expert.  1 central DB expert who will be in charge of organizing the feeding of the DSS - ISP system, working on the construction of functional tables and on the verification and maintenance of the system. The CDBE will work in close coordination with the CTE.  The hardware equipment needed are two PC (a Local mode and a Server mode devices) which have been listed and quoted but can be shared also by other project and activities. | |
| Protocol | Environmental monitoring means the set of surveys that measure determined biological, chemical and physical parameters over time, in order to quantify the impacts of certain activities on the environment.  The monitoring system defined within this protocol is fundamentally based on institutional governance which defines the monitoring of environmental matrices as defined by the community and national regulatory framework. In fact, there is a set of rules at community, national and regional level which identify:  a) the objectives of the monitoring  b) the implementing actors (as institutional mandate)  c) monitoring frequencies  d) the techniques and procedures to be applied for the specific environmental matrices.  The institutional subjects who are therefore responsible for monitoring and organizing data with respect to specific environmental matrices, with particular reference to the components that we have highlighted in the battery of indicators (Land use, use of chemical products in agriculture) are those to whom references for the application of this protocol. | |
| Quotations | The resources needed for the application of the defined monitoring protocol can be summarized as follows:  a) human resources to be allocated to the implementation of the local part – contacts with stakeholders for the collection and initial organization of the preliminary data for feeding the DSS – ISP  a1) 1 local monitoring manager x 1 WD x month x 12 month x 350 Eur/WD = total 8400 Eur  b) human resources to be allocated to the implementation of the central part of the monitoring system - reception, feeding of the DSS system - ISP and data analysis  b1) 1 central monitoring manager x 1 WD x month x 12 month x 350 Eur/WD = total 8400 Eur  b2) 1 central thematic expert for the analysis of data collected x 2 WD x month x 12 month x 350 Eur/WD = total 16800 Eur  b3) 1 central DB expert for the feeding process, management and organization of DSS – ISP x 2 WD x month x 12 month x 350 Eur/WD = total 16800 Eur  c) hardware resources for system management  c1) 1 remote pc (Local mode) Eur 2500[[1]](#footnote-1)  c2) 1 central pc (Server mode) Eur 2500  c3) data traffic and energy supply Eur 100 x year  d) Indirect cost (7% of the total direct cost for personnel) Eur 3528  **Total quotations for the monitoring plan for the first year**  **a) + b) + c) + d) Eur 59028** | |
| **References:**  **(The order of the following references is predominantly respecting an institutional hierarchy, from the EU to the national and regional levels).**  • Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water  • Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration  • Council Directive 91/676/EEC of 12 December 1991 on the protection of waters against pollution caused by nitrates from agricultural sources  • Strategy for the Adriatic-Ionian Region (EUSAIR), 2014  • Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 relating to organic production and labelling of organic products  • Legislative Decree 3 April 2006, n. 152, "Regulations on environmental matters"  • The Regional territorial plan for the protection and rehabilitation of waters in the Calabria Region  • The Regional and interregional basin plan(s)  • The Regional Rural Development Plan of the Calabria Region 2014-2022  • The Integrated production and organic production protocols  Mancuso G., Fusco M. G., Amoroso S.D., Cello M.C., Malagrinò, Ferrante M.C., Latini M., Palermo P. e Barca L. 2015. Impiego del *Mytilus galloprovincialis* trapiantato da impianti di mitilocoltura ad aree ad alto impatto ambientale per lo studio della contaminazione da inquinanti organici persistenti e da agenti virali, batterici e protozoari e loro possibili correlazioni. Poster. Istituto Zooprofilattico Sperimentale del Mezzogiorno.  <https://www.izsmportici.it/portale/attivita_di_ricerca/RC_IZS_ME_01-15-R.S._Dr.ssa_Lorella_Barca.pdf>  Antolín-Rodríguez J. M., Sánchez-Báscones M., Martín Ramos P., Bravo-Sánchez C., Jesús Martín-Gil 2016. Estimation of PCBs content in agricultural soils associated with long-term fertilization with organic waste. Environmental Science and Pollution Research: 16 pp. | | |

1. See hardware note into paragraph on equipment [↑](#footnote-ref-1)