**Assessment of RESOURCES, THREATS AND IMPACTS**

**Agriculture activities in the delegations of Ghraiba, Mahres and Skhira.**

**System cause-effect analysis: Agriculture activities**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **N.** | **Component** | | **Direct Interaction with other components** | | **Management options/Governance Protocols** |
| **Name** | **Quantitative analysis** | **Related Component** | **Component quantitative analysis**  **Description of the interaction between components** |
| *1* | *[Olive groves (Id=122)]* | The indicator in the ISP is the production (tons/year), for each delegation.  Fluctuations in terms of productions are linked with the rainfall regime, the variety of olives and other factors, such as salinity of the natural water resources.  In Ghraiba the olive groves are watered not only by rains and are irrigated using water extracted from wells. The wells’ water has high salinity (threshold 4 g/l). If the limit is reached, the analyses of soil will be carried out (clay must be lower than 10%). Exploratory request to obtain the salinity and soil analyses data. This practice needs management because a lot of wells are illicit.  The production coming from crops with theillicit wells is tolerated Because itonstitutes a significant portion of the production.  Subsidies include equipment, fuel for the machines, and other from the government. But if they build an illegal well, the farmer loses the right to claim the subsidies.  The data were updated adding the indicator “Surface (ha)”.  During the third workshop, it was highlighted some incongruences in the graphs about the surfaces of olive groves. For example, in 2016 in Shkira the surface remained stable until 2012, increased 2013 and 2015, decreased significantly 2014 and 2016. These two last records are possibly mistakes in digiting the field data. Mahres and Ghraiba has the same possible mistake in 2016 (surface, ha). An explanation could be the fact that in Shkira the price of the land is cheaper than the other areas, so the people, from 2013, bought a lot of land to convert it in olive groves. The variety of the olive is the Spanish one, that is quickly replacing the local one. The advantage is that the production is guaranteed all years, while the local is alternate (one year production, the next no), and the growth rate is quicker.  The key factors of olive groves are two: water and the price of the land.  See Report “Agriculture Data Report”.  Add the following indicator: production linked with the area (ha) of olive grove's orchards (ratio production/surface). | *[Rainfall (Id=224)]* | The data (average mm rainfall per month/year) in the ISP are between 2000 and 2019, and they are collected in the station of Sfax.  The stakeholders noticed that 2014 the bar is not responding to the reality. The expert suggested comparing the data with another source.  All the details about their explanations are in the “Agriculture Data Report”. The critical point (=not enough rainfall) has already reached.  The rainfalls affect the olive production.  Once all the available data are entered, it is necessary verifying if there is a direct correlation between the olive production and the rainfall for each year. | **1) Intensify efforts in managing the illicit wells, following procedure already in place to have only legal wells.**  **2) Desalination of waters of legal wells.**  3) Investigate if there are other options (see articles; avoiding the tillage, for example). It was already carried out in Tunisia by the Tunisia Institute of Olive groves. It is ongoing process, the application will be applied in the future. The awareness campaign could focus on both the environment/ biodiversity topics as well as the economic advantage.  **8) Desalination plant (=station)**  9) Dam on river called Wadrane; recurrent but scattered in time of flood.  Verify the status of project supported by AFD Group and the UN’s Food and Agriculture Organization (<https://www.afd.fr/en/actualites/tunisia-prioritizing-climate-change-adaptation-agriculture>) |
| *2* | *[Agriculture activities (Id=121)]* | This component has five subcomponents: [Other Arboriculture Activity (Id=123)]; [Vegetables (Id=124)]; [Cereals (Id=133)]; [Forage (Id=232)] and the Olive groves (Row N. 1).  The data related to the indicator “Exploited agriculture area/Total agriculture land” are entered (1999-2019).  Mrs. Amel Bellaaj Zouari contacted and discussed with the stakeholders about the outcomes shown in the document (see please “From ISP\_irrigated\_agriculture area\_production\_for each delegation\_INSTM\_1\_ABZ\_28Nov22.docx”).  Forage: winter forage disappeared after 2012, possibly due to limited water availability. They don’t sell the harvest, they use it for their family and livestock.  The problem is the rainfall. In the past in October was raining. Now the rain doesn’t arrive in the same period, they don’t plant cereals anymore and the harvest year is lost.  After 2007 the cereals were cultivated only for family consumption, no exportation. | *[Extensive farming (Id=126)]* | The relation, bidirectional, is alimentation/fertilization.  The sheep flocks, goats and cows are using the cereals’ stubble. At the consequence, they fertilise (indirect and direct) the crops.  There is a slaughterhouse only in Mahres.  Cattle farming is reduced or absent throughout the study area for the following reasons: In Skhira and Ghraiba, cultivation is market gardening and not foraging, absence of cattle breeding traditions and absence of a milk collection centre (unsuccessful experience).  Cattle farms had been abandoned in the area because of the absence and high cost of fodder. | **Explore the synergies with ongoing projects (ENI, IFAD, AFD and so on):**  **Example 1:** [**Tunisie : « L’adaptation au changement climatique de l’agriculture et de la gestion de l’eau est une priorité » | AFD - Agence Française de Développement**](https://www.afd.fr/fr/actualites/adaptation-agriculture-Tunisie)  (“A great number of solutions already exist in nature, which makes the adaptative nature-based solutions (SAFN) in the core of the project approach”.)  Other projects are not focused in the same target areas (for example Project financed by Bank Islamic ….).  **For Mahres and Skhira: contact directors to understand the necessities, status, requests.**  There is an going national project to update agriculture maps in Sfax. Maps of fields with crop classification/land use (such as cadastre and land use maps). **This could be the first to be contacted.** |
| *3* |  |  | *[Honey production (Id=128)]* | The honey production is affected by the agriculture activities, and they are an important component for the pollination activities (in terms to providing availability of flowers).  The increase of agriculture activities enhances floral resources for honeybees, which impacts positively the honey production.  Pesticides are spread in a very controlled wayl. Radio with news, so the farmers adopt mitigation strategies to protect the beehives; tractor and helicopter with spreading in big fields. Beehives are close to the settlements anyway.  The data available were not entered in the ISP, because they cover few years, limited to only one municipality.  The beehives move with people. This year, for example, they moved because drought, bees were moved as well with them (transhumance).   "In order to limit the impact of managed bees, public land managers should consider site-specific attributes, whether managed bee colonies have been evaluated for pathogens and parasites, and whether there are declining wild bee species of conservation concern in the region" (Mallinger RE, Gaines-Day HR, Gratton C 2017. Do managed bees have negative effects on wild bees? A systematic review of the literature. PLoS ONE 12(12): e0189268. https://doi.org/ 10.1371/journal.pone.0189268 https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0189268). | **Until now, the activity is at the family level, not industrial. To understand the production and distribution of the beehives, a proposal could be the following: beehives’ license release.**  Simplifying and reducing the procedures for obtaining subsidies in the beekeeping sector (this kind of subsidies already existing)  **Creation of group (association/cooperative, …. *Groupement de/pour le development de apiculture*) of apiculture to develop the activity.** Like the fishermen, they can share their experiences and other.  **Training included.** |
| *4* |  |  | *[Coastal fishing*  *(Id=117)]* | Relation: (versatile workforce)  Workers are seasonally involved in both activities.  Updated estimation (2023): 3000 agriculture delegation of Ghraiba; 2/3 only farmers, 1/3 they work as fishermen as well, so they are farmers and fishermen.  No data available. |  |
| *5* |  |  | *[Shore fishing (Clam and Annelids harvesting) (Id=118)]* | Relation: workers movement  No data available. |  |
| *6* |  |  | *[Rainfall (Id=224)]* | Rainfall affects the agriculture activities (Relation in the diagram).  The data are representing the entire Sfax province, while the data of the crop production is for each delegation. |  |
| 7 |  |  | *[Agricultural Land (Id=24)]* | Agriculture activities affect the agricultural land (Relation in the diagram). The relation is defined as “Affect”.  Recently part of the agricultural land was converted to cultivated areas (not only olive groves, all the crops) from rangeland, this means cultivated land is increasing.  The key factor is water, in case of presence the expansion happens.  Private can rent/ buy the land. State land can rent the country’s land. Rangeland surface is in fact decreasing (data entered in the ISP).  This component and its subcomponents have the surface (ha) as indicator. | Land and subsidies provided by the government. Procedure of selection well regulated. They control land and if they are not productive, the government confiscate the land.  They already received a training. |

**System cause-effect analysis: Fisheries activities**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **N.** | **Component/Subcomponent** | | **Direct Interaction with other components** | | **Management options/Governance Protocols** |
| **Name** | **Quantitative analysis** | **Related Component** | **Component quantitative analysis**  **Description of the interaction between components** |
| *8* | *[Coastal fishing*  *(Id=117)]* | The quantity, in Kg, of fish caught for each year, between 2005 and 2020.  There are three landing seaports, but the data is available only for Mahares, Skhira and Zaboussa.  The reason why in Zaboussa the landing decreased is linked with port siltation (infrastructure problem). Zaboussa doesn’t provide administrative services (only basic services, such as fuel).  Fishermen use mainly Shkira and Mahres ports for the last years.  CPUE: Catch per unit effort is the catch divided by the number of boats in each harbour.    Fisheries’ Data Report  FOR COASTAL FISHING: Pages – 81-82  FOR PURSE SEINE FISHING: Pages –96-98 | *[Fish (Id=146)]* | Fish is a component that has two subcomponents, "Pelagic" and "Benthic", described in the following rows (N. 9 and N.10 respectively).  The relation between coastal fishing and fish is "exploits". The fish is the resources that the fishing activities is using.  Since 2014 all the oceanographic research campaigns have been stopped.  2021-2022:  ACG: Association of Continuity of Generations. -> May 2022 put again artificial reefs to discourage illegal fishing.  Collaboration with APAL, Med Fund as co-manager, supported by CEPF (Critical Ecosystem Partnership Fund)  87 reefs now \_-> to obstacle the movement of trawlers  87 created; 13 immersed and filled with palm. TOT 100 all along the wadi. | Intervention to improve the functionality of Zaboussa seaport. The responsible must find a solution to be adopted only for the fishermen, not all the infrastructure.  Step by step process: first phase would be focused on the infrastructure’s improvement (dragage, sand removal). Then, in the second step, the fishermen services provided by DGPA will be restored.  APIP will be the first institution to be involved, being the responsible.  Nowadays there is not an active project to face this problem. **Priority action**.  Possible synergy: it would be interesting contacting ACG and understand better its project. Can they share a map where these reefs are put, their contacts?  DGPA and locals have a new project, to search the best solution and the best reef to block the illegal fishing and not to impact on the habitas (Ghannouch, Gabes and Sfax). |
| *9* |  |  | *Pelagic* | The indicator is "catch specific richness", the number of species caught per year.  In Fisheries’ Data Report:  \*Number of species  This indicator is the most used in biodiversity monitoring.  Fish:  Pelagic  For each port and for each year, the number of species caught.  Pages 98 - 100  Biodiversity data are coming from the catch because: surveys’ results are available (before 2014).  Sporadic monitoring surveys, carried out for only few targeted species, were carried out every four years in certain areas, they collect information about the biomass and if the status of the exploitation (indicator: species abundance and measures of individuals of target species). They used models stock assessment, predicting if the populations are exploited or not.  Now AFD financed a project, monitoring studies at seaports for target species in all Tunisia, included the Gabes gulf (biometric measures) First results expected for (…..).  Data about the population (estimate of the density or biomass) are not available.  The relation between the total catch from fishing activities and the richness should be investigated.  In the ISP there is the data along the years showing the variability of specific richness. | Integrate the AFD project results concerning fish recorded around the project target area - Kneiss islands - in the ISP. (DEADLINE *IS IN CASE*). Comparison of data (7 priority species) collected from two different institutions (DGPA and AFD).  Monitoring artisanal fisheries around Kneiss islands because the actual lack of information. This is important in the area.  Review of all the lists of species, to avoid the confusion or misunderstanding. Suggested collaboration between Institutions. Example: Sardine/Sardinelle. Training to the *commissioners* (professional that verify fish caught). **PRIORITY ACTION**. |
| *10* |  |  | *Benthic* | The indicator is "catch specific richness", the number of species caught per year.  In Fisheries’ Data Report:  \*Number of species  This indicator is the most used in biodiversity monitoring.  Fish:  Benthic  Pages –100-101  Data about the population (estimate of the density or biomass) are available in ISP. |  |
| *11* |  |  | *[Crustacea (Id=149)]* | Crustacea has a double relation with the Coastal fishing, which exploits the resources but, at the same time, is also affected by the presence of the invasive blue crabs.  To highlight the impact of this alien species, the component Crustacea has two subcomponents (native and invasive), described better in the Rows N. 12 and13.  The indicator linked with Crustacea is "specific richness".  In Fisheries’ Data Report:  \*Number of species  This indicator is the most used in biodiversity monitoring.  Crustacea  Pages 101-103 |  |
| *12* |  |  | *[Indigenous species (Id=239)]* | The indicator is "Catch specific richness". Graph is still empty. |  |
| *13* |  |  | *[Invasive species (Id=240)]* | The first indicator is "Specific richness". *Callinectes sapidus* (from Atlantic, Gulf Mexico) is the only invasive species reported in the area.  The second indicator is "Abundance".  An investment in development fishing and commercialization of blue crab is already in place and well established. In 2019 the Tunisian government and FAO open a factory for the preparation of the crab in Kerkennah. In the same period the manufacturing plants were opened in Zarzis. Many factories now, included in Skhira, Ghannouch. In 2021 the “Development fishing and commercialization of blue crab" was promoted in Bizerta and Ghar El Melh lagoons as well. | Tunisia is one of the countries involved in the new GFCM research program on blue crab (https://www.fao.org/gfcm/news/detail/en/c/1438849/).  These fisheries management measures have recently been transposed into EU law (https://www.europarl.europa.eu/legislative-train/theme-fisheries-pech/file-transposition-of-gfcm-fisheries-management-measures-into-eu-law).  Possible synergy/collaboration with the research program mentioned above ("Green Control” Consultancy who developed SID (System d’Information Décisionnel) for DGPA, ongoing. App with fish identification sheets). **Already discussed with the general director of DGPA. MED4EBM recommandations will be considered by DGPA and consequently by Green Control.**  Training and capacity building for the responsible of the data collection on the seaports, in a way that they are classified the collected species not based on the commercial names only but also with the scientific names. (Verify if the new project is already covering this aspect). **A training on the identification of landed species in Tunisia will be held at a national level from 5th to 7th September<-Done**  **Training needed to correctly classify the species, to avoid confusion between the shrimps (*crevette blanche* – Parapenaeus longirostris- and *crevette grise* - *Crangon crangon.***  Please, note that the stakeholder called *Parapenaeus longirostris* crevette blanche, but in the FAO website is called “crevette rose du large” (<https://www.fao.org/fishery/en/aqspecies/2598/en>).  For other species classified and names in the FAO website, see: <https://www.fao.org/fishery/en/aqspecies/search?q=document.aqspecies.aqSpeciesIdent.name_en:shrimp>) |
| *14* |  |  | [Mollusca (Id=150)] | In Fisheries’ Data Report:  \*Number of species  This indicator is the most used in biodiversity monitoring.  [Cephalopoda (Id=151)]  Pages –103-104  [Bivalvia (Id=217)]  Pages 104-106  [Gasteropoda (Id=157)]  No data |  |
| *15* |  |  | [Other marine Invertebrates (Id=153)] | - |  |
| *16* |  |  | [Nesting species (Id=144)] | - |  |
| *17* |  |  | [Marine Vegetation (Id=137)] | - | The management action / GP can be integrated with that outlined in the row N. 8 |
| 18 |  |  | [Marine Environment (Id=26)] | Indicators: pH; number of harmful algal blooms; sea water temperature; concentration of nutrients.  Because they were not available, INSTM organised and is carrying out the water surveys.  Data are available.  The data about the harmful algal blooms are currently number of events per year. In the technical report the number of events is relative to the harvesting season.  Annual HAB events’ data available in ISP were used as indicator for marine environment pollution. | PROTOCOL DOCUMENT was written. |
| 19 |  |  | [Visiting Activities (Id=132)] | *Pescatourisme* (Recreational fishing); phenomenon not quantified yet. |  |
| 20 |  |  | [Agriculture activities (Id=121)] | Workforce. |  |
| 21 | [Shore fishing (Clamharvesting) (Id=118)] | ,  Clam data are available. | [Mollusca (Id=150)] | The relation is exploits.  Mollusca has no indicators, but each of its subcomponents, described in the “Fisheries’ Data Report”, have the Specific richness indicator (no biomass data yet though).  INSTM monitors Noro virus and toxic phytoplankton, other institutions monitor *E. Coli*, heavy metals and toxins (Pasteur Institute), PA, and so on. DGSV coordinates all these monitoring programmes.  INSTM entered in the ISP data about number of harmful algal blooms. The station is S5, close to Kneiss islands.  FAO is working through the Blue Hope Project (Ecotourism 2018) with local associations.  Average return for the women from 1$ to 12$ for each Kg (2020).  TO PROMOTE THE SUSTAINABILITY: they recommend harvesting only mature individuals, avoiding harvesting the small ones.  Asked data about the workforce (*femmes collectrice*) 2005-2020 (7 July ‘23). Available the legal authorized collectors. The women didn’t want to give their names, so these are not included in the list. Some of them they were authorised anyway, given the status of poverty. | Covering the gaps to proceed to request the certification MSC.  Proposal: creation of GDP for which the leader should be a woman, to facilitate the authorisation process, to get the medic/ health certification, to increase the trust of the female collectors. This would eliminate the figure of the intermediary, which nowadays is always a man*.* This would bring benefit of better incomes, without quotes for the middlemen.  **Propose to DGSV to provide the past data about all the data collected by the different institutions to be entered in the ISP. Moreover, propose an agreement to provide the future data to update the ISP.** The comparison of all the monitoring programs outcomes will clarify and explain better the relations between the clam population trends and possible source of impacts.  **Proposal: Creation of a shared platform between all monitoring institutions at a national level in order to benefit from the different inputs and to better explain the clam’s activity./A Convention has to be requested by INSTM to have an access to DGSV’ s database and to join efforts.** |
| 22 | [Fisheries  (Id=116)] | Indicators:  Sanctions  None. Data 2018 – 2021 available.  See “Fisheries’ Data Report”.  Catch by fishing type      Catch by species    Catch by group | [Wind (Id=227)] | Special Meteo Condition Report *(Bulletin Metereological Special*) communicates the daily info about the wind to the fishermen by the local office, in order to warn them if the wind conditions are dangerous for navigation.  The data available now in the ISP are coming from tutiempo.com and are not specific to the fishing area (the weather station is in Sfax).    A BMS *(Special Metereological Bulletin*) is produced by the meteorological services and would be announced in order to warn the fishermen if the wind in the sea is dangerous for navigation (wind force>7 Beaufort by coasts and wind force>8 Beaufort in the large). | Proposal: ask the BMS stats.  Important to explain the wind dynamics with the long-term wind trends; this analysis could potentially bring more info also about climate change impacts. If the frequency of disasters increases, this relation fishery activity – wind will highlight the phenomenon, for which the policy makers should react with specific actions. |

**Some references and source of information:**

[*https://projects.worldbank.org/en/projects-operations/project-detail/P160245*](https://projects.worldbank.org/en/projects-operations/project-detail/P160245)

[*https://www.fao.org/neareast/news/view/en/c/1609131/*](https://www.fao.org/neareast/news/view/en/c/1609131/)

[*https://documents1.worldbank.org/curated/en/318211538415630621/pdf/130406-WP-P159856-Tunisia-WEB2.pdf*](https://documents1.worldbank.org/curated/en/318211538415630621/pdf/130406-WP-P159856-Tunisia-WEB2.pdf)

[*https://www.ifad.org/en/web/operations/w/country/tunisia*](https://www.ifad.org/en/web/operations/w/country/tunisia)

[*https://assafirarabi.com/en/47396/2022/09/10/agriculture-in-tunisia-in-the-twenty-first-century-challenges-and-risks/*](https://assafirarabi.com/en/47396/2022/09/10/agriculture-in-tunisia-in-the-twenty-first-century-challenges-and-risks/)

[*https://www.swp-berlin.org/en/publication/tunisia-a-stable-countryside-for-a-stable-country*](https://www.swp-berlin.org/en/publication/tunisia-a-stable-countryside-for-a-stable-country)