**Assessment of fishing activities in the gulf of aqaba, jordan**



The discussions around the Component “Fishing activities” started with the analysis of each of its subcomponents (occupational and recreational fishing and fishing violations). Each subcomponent and the relative relations are shown below and described in detail in the subsequent System Cause-Effect Analysis table.

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| Timeline  Description automatically generated with medium confidence |

**System cause-effect analysis: Fishing Activities**

**Container [Fisheries (Id=146)] -> Component [Fishing activities (Id=58)]**

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| **N.** | **Component** | | **Direct Interaction with other components** | | **Management options/**  **Governance protocol** |
| **Name** | **Quantitative analysis** | **Related Component** | **Component quantitative analysis**  **Description of the interaction between components** |
| 1 | [OccupationalFishing (Id=59)] | “Fishing activities", described in the Row N. 6, is a component that includes three subcomponents: “Occupational Fishing”, “Recreational Fishing” and “Fishing Violations”.  “Occupational Fishing” includes the activities that involve professional fishermen.  Considering the indicators “total monthly catch (Kg)” and “Total fish catch by day (Kg)”, a general negative trend was registered between 2014 and 2021, with the exception for the 2022. The reasons linked with the higher catch are mainly linked to two factors: a) *fuel prices increased during the past few years, prompting fishermen to fish close to ports and with deep waters, which are usually productive fishing areas; b) exceptional catch of sardines. The Kg of sardines caught was so high - the highest number since the beginning of the monitoring program, with an estimated total amount of catch of 80,000 Kg, that affected the trend. It is.*  Nevertheless, the Jordan authorities considered the overall negative trend, and they imposed a full fishing ban between April and August 2021. Only deep-sea fishing was allowed between July and August 2021.  In 2022, between January and April there was another halt of fishing activities in shallow water, except catching bait.  The indicator “Fisheries total catch by months (Kg) is updated (2014-2022).  ACT recorded considerable Kgs of fish. The waters there are deep and the area is not disturbed by the human presences except for the cargos.  OMP (Opposite Marine Park) is also an area with high fishing activity.  The data that are shown on the ISP confirmed the opinion of the fishermen, interviewed by Hala.  The third area where the fishemen said that are going is HA (Hotel area), but in this case the amount of Kgs is not relevant like the other areas. This because they are pushed away by the military boats due to the accusation of annoying the tourists, despite that it is a legal fishing area. Also they are put cages, so the technique is different compared with other areas. | [Fish (Id=33)] | This component belongs to the “Fauna” Container. It includes the following subcomponents: “Pelagic fish”, “Reef fish” (see Row N.3), “Coastal fish” (see Row N. 4), “Migratory fish”.  At the actual stage (August and November 2022), the ISP software has not data entered of “Pelagic fish”, “Coastal fish”, “Migratory fish” from the National Monitoring Programme.  Data from Marine Habitat Map: a check list of the fish species is available and entered in the SQL; it will be entered by half November.  The “Reef fish” subcomponent has the direct relation with the coral reef health and the data are collected through ReefCheck and the National Monitoring programme.  The fish species listed in the “Fish” component could be affected by the fishery activities: 1) directly, because unregulated fishing and/or overfishing could have negative impacts on the trophic network, unbalancing the marine ecosystems; 2) indirectly. Some fishing techniques can increase the probability of by catching no-target species or sea birds (2006), some others have a relevance in the ghost fishing.  January – April is season of tuna migrations, so the higher number of Kgs are linked with these species. | Coordination and synergies with the Project of Recirculation Aquaculture System (RAS), already proposed by ASEZA, ADC (= executive dept. of ASEZA) and FAO in 2021. It is starting, 2 Km inland inside the Marine Science Station (Check the info).  The “fishermen protocol” will collect the fish values (JD), which is sold to fish market or privates, such as hotels or restaurants.  Building synergies and collaborations with stakeholders, such as Fishing Association, Min. Agriculture, ASEZA, and other international institutions, like  IUCN and UNDP Jordan, to exchange information and experiences. Moreover, to avoid duplications or repetitions of projects and activities.  Check vulnerable list for Jordan. Red List of Jordan just finished. Cross the data of the caught fish. How many of vulnerable are caught?   1. “Fishermen protocol” data collection (ToR) 2. Cross the information 3. Management options to mitigate the catch against red list identified for Jordan |
| 2 |  | The map of the zonation of the fishery activities shows the different total catch in the different areas over time. | *[South beach (Id=78)]* | It is including also Marine Reserve.  In the diagram the relation between the components “Occupational fishing” and “South beach” is bidirectional. The key words used to describe the nature of these relations is “negative/positive”.  “Negative relations” could be attributed to the limited fishing areas allowed and regulated by the actual laws. The fishermen asked an enlargement of the fishing area.  “Positive relations” are linked to income that is coming from selling fish to the touristic facilities in the “South beach” area. The sale is informally and privately agreed between the restaurants and the fisherman. For this reason, there are no previous data about the price of fish, the fish species sold and the quantity. | Fishermen society will collect data in the landing sites (in connection with market, cool room to store fish and possibly restaurants and other places where the fish is sold). This facility can provide the opportunity to start to collect the data that are nowadays lacking, such as price at which the fish is sold, the measures of the individuals, the species and quantity sold to the restaurants and hotels.  **PRIORITY**  ASEZA has already planned a Directorate to manage fisheries activities. MED4EBM recommends ASEZA to include training and data collection. MED4EBM will hand the experience to ASEZA.  A possible collaboration between the Environmental Police and the Navy could help to quantify the relation between the effort to catch a particular fish species and the price at which it is sold. This could help to understand if the fishing effort is repaid and sustainable.  This option is not feasible.  ICZM Bylaw stakeholders will have essential role |
| 3 | [Recreational Fishing (Id=60)] | “Fishing activities", described in the Row N. 6, is a component that includes three subcomponents: “Occupational Fishing”, “Recreational Fishing” and “Fishing Violations”.  License is given with no professional fishermen; the fee for recreational one is different, and the person can have another job.  Potential indicators to be added to the ISP:   1. Number of individual licenses of recreational boats 2. Number and typology of recreational boats 3. Number of licenses for the fishermen 4. Number of licenses for fishing 5. Species of the caught fish 6. Size of the caught fish   The “Recreational fishing” activities were regulated only since 2021.  There are 50 licensed recreational fishing boats.  A new company was created, called Eco-Fishing Association. It organises fishing tour for tourists, and it can provide information about the effort, the species and the number of fish caught, the number of tourists for each tour, and so on. But the affiliation is currently suspended due to a defect in the recognition. Still unknow 21/07/2023.  The recreational fishing practicing is in the areas of occupational fishing.  In the recreational fishing the only technique allowed is the fishing rope. | [Reef fish (Id=37)] | The component “Fish” (described in the Row N. 1) includes the following subcomponents: “Pelagic fish”, “Reef fish”, “Coastal fish”, “Migratory fish”.  For the description of the component “Fish” see Row N. 1. | Explore the option to collect the number of fish and the species from the recreational boats and other relevant information. |
| 4 |  | [Coastal fish (Id=36)] |
| 5 | [Fishing Violations (Id=62)] | “Fishing activities", described in the Row N. 6, is a component that includes three subcomponents: “Occupational Fishing”, “Recreational Fishing” and “Fishing Violations”.  The main violations committed from the boats are catching illegal fish sizes or protected species. The illegal fishing committed from beaches is more targeted on catching ornamental reef fishes for aquaria.  The data regarding the “Fishing Violations” from the rangers and Navy are not available in the ISP yet (Still pending – 26th November 2022).  An option to explore, in order to get this kind of information, is contacting the Navy.  To quantify better the impact of the poachers from the beaches, one option could be contacting the Environmental Police, that are the responsible of beach patrols. Some data available is in the ISP from the Env. Police. Others were asked from the Navy, still pending (26th November 2022).  They force to return fish to the sea.  Size 9 cm, except the sardines. | [Fish (Id=33)] | To quantify the relation between the “Fishing Violations” and “Fish” – and its possible negative impacts on the wildlife - we identified the following ornamental reef species.  “Fish” component in the ISP  Indicator: presence of species  Data series: endangered, alien, commercial  **In “Commercial” there are three classes:**  **0=Non-Commercial**  **0.5=Illegal (use for aquarium)**  **1=Commercial (legal)**  The following species/families are classified as ornamental:  Butterflyfish (family Chaetodontidae)  Family Haemulidae  Broomtail wrasse (Family Labridae)  Grouper (family Serranidae)  Humphead wrasse (family Labridae)  Bumphead parrotfish (family Scaridae)  Parrotfish (family Scaridae)  Snapper (family Lutjanidae) | 1. **From the beach fishing: If an intensification of patrols is put in action to reduce the poaching of the ornamental species, the expected outcome is an increase of the number and abundance of them**. 2. Capacity building for Env. Police and Navy; topics such as biology of species, training in species classification and size evaluation. 3. Improve the equipment to use along the beaches, such as smart tools, camera and other monitoring systems, personnel recruitment. 4. Possible synergy with ongoing UNDP project Aqaba Marine Reserve 5. Possible synergy with a project on the management of the marine protected areas, planned to begin in 2024 by IUCN and ASEZA. 6. See synergies with Blue Flag, linked with environmental awareness (e.g. signs). |
| 6 | [Fishing activities (Id=58)] | The fishing activities have three sub-components; the data are stored in one of its subcomponents (“Occupational fishing”) at the moment.  Indicators in the ISP:  Number of boats  Number of fishermen  Number of fishing licenses  Fishing gears (type)  Landing by species (Kg / day) | [Corals (Id=46)] | Relation described is "damage".  Direct impact: destruction of coral with anchor, for instance.  Impacts:  Losing gears  Bycatch coral fish species not allowed to be caught  Other indicators that were added to measure the pressure of the fishing activities are in the ISP: presence, richness and size of coral species.    Data available are coming from JREDS initiative.  A programme of wider survey is planned by ASEZA, Coral Watch - Citizen Science.  ReefCheck and Coral Monitoring Programme are monitoring the rubbish and ghost gears (check if they collect or they only count), damage in general. UNDP requested data last week (autumn 2022), still pending.  On May 2022, ASEZA and UNDP Jordan signed an agreement to support the management of the Aqaba Marine Reserve and to develop designs for the Aqaba Science Park. This cooperation comes within the framework of the Green Deal, with the support of the European Union for Jordan, to work to promote sustainable economic development, with a focus on measures to address the impact of climate change and support green growth and economic development. Two million project. Objective: monitoring reserve (blue flag). The Marine Reserve already received the blue flag.  IUCN: effectiveness of management of marine protected areas (aim: green list). Tentatively in list, pending for the second phase.  The data of the impacts are regarding the areas where is the fishing activities are illegal. Only the baits catch is permitted; precise size of nets, controlled, from two-three sandy areas. Poaching is present.  Bottom nets are not permitted. | 1) Coordination and synergies with all the actors to optimisation of the resources (proceed and implementing surveys and increase the monitoring surface. ASEZA signed with diving association "diving clean up". Since 2023, the campaign is successful, with several sessions. Tourists and volunteers as well. Plus, the new monitoring programme.)  2) Awareness addressed to fishermen and tourists with the following topics: poaching is negatively impacting the economic activities because they affect the commercial fish stock, destruction of the habitat of the species, included those of commercial interest, impact on the stocks.  3) See line N. 2. In relation with the fisheries and corals, it would be beneficial having a market where the measures of the fish and the species are recorded. Planning already ongoing. It is more probable that undersized fish and the coral species are coming from illegal activity around the coral areas. |
| 7 |  | In particular linked with the subcomponent “Recreational fishing”, where the only company allowed to practice this fishing activity is the "Ecofishing Organisation".  AMR is protected, plus 300 m buffer of protection is added since 2023. Length 7 Km. This to avoid damaging even more the coral reef (shapefiles needed, informally asked during the meeting of 21 July). | [Tourist Amenities (Id=91)] | It has 11 sub-components.  Relation: management issues.  Use of the nets and illegal activities are particular impacting the protected areas.  The availability of data for now are limited to the sub-component "diving centre" and “diving sites” and “cruise ships”. The indicators will be number of divers, their nationalities, diving locations, the name of diving centre companies and the dates and time. | **In ToR MED4EBM.**  **PRIORITY.**  Navy and rangers need to validate the regulation and modify it, if necessary. |
| 8 | [Tourist Amenities (Id=91)] | The relation between these two components is not present in the diagram yet.  It is important because there is an impact from the illegal fishing practices carried out by the tourists.  Indicators that can describe the impacts of the tourist activities on the environment can be comparable with those used in the sub-component” Fishing Violations”.  To quantify better the impact of the poachers from the beaches, one option could be contacting the Environmental Police, that are the responsible of beach patrols. Some data available is in the ISP from the Env. Police. | [Corals (Id=46)] | Indicators could be anchoring damages of coral, ghost gears or lines.  Tourists are doing fishing activities, because they lack expertise. They can use illegal practices, such as the examples of glass bottom boats (anchoring or fishing activities, that are illegal). Cruise also proposes the fishing, but it is illegal.  Actual regulation says that they can use only the lines, nothing else. They must ask the approval license to use the lines.  Action put in place nowadays or in the next future: UNDP, EU and ASEZA preparing plan to change signs to add the illegal activities list. Design done, planning to set very soon (within 2023).  Visitor centre will be provided of awareness material, website included and social media. | Coordination of awareness campaigns already planned or ongoing in order to integrate some aspects not covered yet (Check with JREDS and other project. Waed will give all the details, 29 August).  This campaign should go together with an intensification of patrols and fines.  Involving influencers, living in Aqaba, to share awareness messages on their videos; on volunteering base. |
| 9 |  | [Fish (Id=33)] |  | The goal d (=Conduct Reef Check monitoring at six selected diving sites agreed on in the proposal) of the “Diving protocol” application is at the final stage of preparation. There will be a trainer that is responsible to instruct the candidate volunteer divers to collect the data responding to ReefCheck standards.  **Recommendations for the protocol**: add all the details of the diving sites (coordinates; name of the site; correct acronym commonly used; specify if it is accessible to the tourists or accessible only by experts that carry out surveys) |
| 10 |  | [Mollusca (Id=39)] |  |
| 11 |  |  | [Marine Reptiles (Id=41)] |  |
| 12 |  |  | [Crustacea (Id=38)] |  |
| 13 |  |  | Marine mammals |  |
| 14 | [Fisheries (Id=146)] | No indicators | [Management Tools (Id=102)] | This component has NO indicators in the ISP.  Its subcomponents are:  [Security and Management Control (Id=375)]  [Scientific Research and Monitoring (Id=376)]  [International Coll. and Devel. (Id=377)]  All three subcomponents have NO indicators in the ISP. |  |

**System cause-effect analysis:**

**TOURISM**

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| **N.** | **Component** | | **Direct Interaction with other components** | | **Management options/**  **Governance protocol** |
| **Name** | **Quantitative analysis** | **Related Component** | **Component quantitative analysis**  **Description of the interaction between components** |
| 15 | [Tourist Amenities (Id=91)] | It is not described by any indicator.  Indicator:  Industrial diving activity (number of professional divers; type of service provided. Data source: social security system Aqaba labour dept).  Subcomponents:  [Other touristic activities (Id=96)]  Indicator: number bottom boats  [Diving Centre (Id=92)]  Indicators: number of certified diving centres; number of divers (users); night dive stats; number of diving boats  [Diving Sites (Id=93)]  Indicators: number of sites; type of sites; artificial reefs; dive sites visitors | [Management Tools (Id=102)] | **The relation is defined: Management Control**  This component has NO indicators in the ISP.  Its subcomponents are:  [Security and Management Control (Id=375)]  [Scientific Research and Monitoring (Id=376)]  [International Coll. and Devel. (Id=377)]  All three subcomponents have NO indicators in the ISP. |  |
| 16 |  |  | [Tala bay (Id=80)] |  |  |
| 17 |  |  | [Beach Hotels (Id=81)] |  |  |
| 18 |  |  | [Touristic Resort and Village (Id=82)] |  |  |
| 19 |  |  | [Other Resorts (Id=83)] |  |  |
| 20 |  |  | [Fishing activities (Id=58)] | **See line 7**  Bilateral relation: Management Issues |  |
| 21 | [South beach (Id=78)] | **See line 2**  Indicators:  Number of visitors  Water quality  Waste management | [OccupationalFishing (Id=59)] | Bidirectional direction: positive/negative  Subcomponent of Fishing activities |  |
| 22 |  |  | [Aqaba Aquarium (Id=98)] | Relation: financial benefits vs Aqaba Aquarium  Indicators:  Number of visitors  Number and species (such as fish and/or coral collected or recover of individuals) |  |