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1 Part I: Static Analysis - Collective action

The coastal fishery in Alanya is situated in Antalya Province along the southern Mediterranean coast of Turkey. The original case, which spans from 1976-1978, catalogues approximately 100 registered farmers operating 45 small inboard boats; pelagic fish (including bonitos and large carangids) are the target resource unit. There is only one user group organization and no subgroups (just one group of small boat fishermen). The fishermen cooperate with one another and have access rules that involve listing the fishing spots and then distributing them through a lottery. The fishermen use the mechanisms of the local cooperative to oversee the lottery even though only half of the fishermen belong to the cooperative. The key resources (natural infrastructure) in the system are the complex marine food web (shared). The key resource relevant to the commons dilemma faced by the community is the pelagic marine fish stocks and their productivity (common-pool). This case study is part of the original Common-Pool Resource (CPR) database. A summary of the original CPR coding conducted in the 1980s by Edella Schlager and Shui Yan Tang at Indiana University may be found here.

1.1 The Commons Dilemma

- Since the 1960s, the increasing number of net fishermen in the area led to severe conflicts as fishermen were cutting off one another's supply of fish by placing their nets too close and crowding the better sites. Over a period of 15 years, the net fishermen of Alanya overcame the problem of poor coordination of appropriation as they developed a fishing system to minimize gear interference and optimize production of the best sites by allocating them through a lottery system with a rotation provision to ensure equal chances of fishing the best sites. Fishermen have perceived this 'formalized' system as fair since some of them have applied it to fishing other species during the off-season as well as for tourism sites. Fishermen generally abide by the respectful distance between fishing sites established by the formalized agreement, even during the off-season. Violations of the agreement are dealt with by the fishing community in the local coffee house through the application of social sanctions, and sometimes by the threat of violence.
- In terms of the potential under-provisioning of public infrastructure, the success of local-level management is outside the control of the local fishermen. Fishing rights cannot be formalized by the cooperative as it has neither the legal authority nor the economic power to gather all of the fishermen under its umbrella.

1.2 Biophysical Context (IAD)

- **Natural infrastructure:** The Mediterranean Sea consists of biologically-poor waters due to its oligotrophic (i.e. low nutrient levels) conditions leading to low levels of productivity. However, the continental shelf off the Alanya coastline drops off rapidly leaving target migratory fish species in highly concentrated numbers at their preferred depth levels. These biophysical conditions make for a very productive fishery for those who set their nets in the right spots. From September to December, fishermen harvest carangid species (mainly *Lichia spp.*) as they migrate from east to west and when they reverse migration from west to east after January. During most of the June to August period, fishable stocks are scattered throughout the bay. The small size of the community renders it less costly for members of the group to recognize each other, thus enhancing the ability of the group to detect rule infractions by members of the group, and entry into the fishery by non-group users.
- **Hard human-made infrastructure:** The fishermen of Alanya operate 45 small inboard boats. The small-scale motorized boats are 8 m open boat with a 10-25 HP inboard diesel engine (larger units may use 10 m boats with 3 fishermen). Few boats are equipped with depth recorders or fish finders. The gears used are mostly trammel nets, which are modified gillnets of small or large mesh depending on the target species and set on the bottom within the shelf area, and longlines, which consist of a series of baited hooks on a main line attached to a float. Boats return to home ports within a day and the catch is marketed locally. The established randomized and rotational allocation of rights ensures that all fishermen get an equal chance to fish the best sites. There is one small trawler based in Alanya, which likely is a 15-25 m wooden boats of a schooner-type design and a crew of 7 to eight men that drags a bag-shaped net equipped with otter-boards and catches demersal fish. However, due to the narrowness of the shelf area, the Alanya trawler is forced to operate elsewhere.

1.3 Attributes of the Community (IAD)

- **Social Infrastructure** There are about 100 registered fishermen based in the town of Alanya, and about half of them belong to the one cooperative in town. The other non-cooperative members sell to independent vendors in the town market. Membership to the cooperative helps legitimize the fishing system, which is negotiated at a coffee house where a randomized and rotational allocation of fishing rights takes place every September at the beginning of the migratory species fishing season. During this meeting, a master fisherman compiles a list of those who want to participate in the net fishery, and a list of the named fishing sites, which are regularly spaced to minimize gear interference. At the coffee house, fishermen draw lots to randomize allocation and to ensure that every interested fisherman is assigned to a fishing site. These informal rules are formalized in a contract that outlines the named fishing locations and agreed-upon fishing arrangement which is then deposited with the local gendarme and the mayor. From September to January, each fisherman moves to the next site east each day. Fishermen in excess of the number of sites in rotation draw blanks, and they are rotated in, while those holding the blanks can rest, mend nets, or go long-lining. When the fish reverse their migration in January from west to east, fishermen also reverse their movements by shifting one site to the west each day until the end of the season. Trust among resource users appears high, since this system is voluntarily

adopted for other fisheries (inferred).

- **Human Infrastructure** Human infrastructure in the Alanya fishery is assumed to be high (inferred), even though the percentage of traditional fishermen is well under 50%. The principle of randomized and rotational allocation of rights that the fishermen have learned has become so popular that small groups of fishermen have set up similar systems among themselves at other times of the year. Other sectors, like boats chartering to tourists in summer, have also adapted a similar system in which boats strictly follow the order determined by a lottery rather than competing with one another for the tourists. About 25 fishing boats supplement their income by chartering to tourists during the summer.

1.4 Rules in Use (IAD)

Position Rules: 1) Approximately 50 fishermen who are members of the cooperative, 2) Approximately 50 fishermen who are non-members of the cooperative, 3) 1 master fishermen who is responsible for compiling a list of fishermen participating in migratory fishery and a list of the named fishing spots, 4) 7-8 trawler fishermen based in Alanya, 5) 38 tourist fishing boat operators, 6) Sport fishermen, and 7) Spearfishing divers.

Boundary Rules:

- The right to fish is not restricted in a general sense, but access to the highly productive net fishing sites is restricted to the members of ‘the community of fishermen’.
- Members of ‘the community of fishermen’ are informally defined on the basis of their willingness to consent to an agreement that outlines the randomized and rotational parameters of the fishing ground with respect to the best fishing sites.
- The ‘community of fishermen’ formalizes rules for entry into the net fishery every September at the beginning of the fishing season for migratory fish. Fishermen who have endorsed a list of named fishing locations and the agreed-upon arrangement for fishing them may enter the fishery. They are then assigned to a particular fishing site through lottery.
- Knowledge of the names and locations of the best fishing sites selected by the ‘community of fishermen’ agreement is key to restricting access to only those fishermen who have served an apprenticeship in the fishery, either as hired crew or as family members or friends.
- Fishermen in excess of the number of available fishing sites in rotation draw blanks and cannot fish until the next rotation.

Choice Rules:

- Non-cooperative members may sell their catch to independent vendors in the town market.
- The informal contract for entering the net fishery, though not legally binding, may be enforced by the mayor and gendarme, although not likely.
- ‘The community of fishermen’ may draft and enforce local fishing regulations for the net fishery according to a loose interpretation of the Aquatic Resources Act, which states that cooperatives have jurisdiction over “local arrangements”.

- Fishermen who want to participate in the rotational system must have knowledge of the fishing ground in order to be familiar with the named fishing sites and be able to follow the fishing order and set nets in the right place.
- Cooperative members may fish with longlines for demersal species or handlines for pelagic species, though not under any formalized agreement.
- During the off-season for migratory species between June and August, and thus not under the formalized agreement, net fishermen may still abide by a general rule of respect through which they still space their gear a respectful mile or so from one another.

Aggregation Rules: At the yearly September meeting of 'the community of fishermen', those interested in entering the net fishery decide whether or not to agree to the list of available named fishing sites and the rotational order for fishing them. Once they agree, and endorse the contract, they can enter the fishery.

Scope rules: Noncompliance of the rotational agreement lead to the application of social sanctions and sometimes threats of violence.

Information Rules: Every September at the beginning of the migratory species season, fishermen are shown the list and location of the best fishing sites along the coast to be drawn as a lottery among the fishermen in agreement of the arrangement.

Payoff Rules: By participating in the randomized and rotational allocation of fishing sites system, every fisherman gets an equal opportunity to fish the best sites.

1.5 Summary

There remains limited conflict between the small boat fishery and other kinds of fisheries, as well as competition with an increasing number of sport fishermen and spearfishing divers in the area. However, the Alanya fishery provides an elegant example of rules of fishing conduct (i.e. the rules governing how the accepted users shall conduct themselves). Despite the lack of control of the cooperative over fishing rights, fishermen in this area can and do influence the fishery via an organized and randomized rotational system of fishing site allocation among the members of the cooperative who agree to the arrangement every year. Furthermore, the author argues that because the resource users meet annually to compile the list of participating fishermen and available fishing spots, the system is flexible to changing conditions, e.g., in 1983 there were 34 sites and 37 boats, and in 1985 there were 37 sites and 40 boats. The tendency to increase fishing spots and resource user access may, however, also be an indication of increasing overexploitation of the fishery (inferred).

2 Part II. Dynamic Analysis - Robustness

Given the source document, there is insufficient data to make any assessment on the temporal dynamics (resource and social conditions, etc.) of this particular common-pool resource. The contributors thus far have been unable to locate any specific updates for this case study.

3 Part III. Case Contributors

Maria del Mar Mancha Cisneros, School of Life Sciences, Arizona State University.

Ute Brady, School of Human Evolution and Social Change, Arizona State University.
Sechindra Vallury, School of Sustainability, Arizona State University.