

Wildlife Communities in the Service of Extensively Managed Fishpond Systems - Advantages of a Symbiotic Relationship

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Abstract : Extensive fish farming is one of the most traditional forms of aquaculture in Europe, usually practiced in large pond systems with earthen beds, where the growth of fish is based on natural feed and supplementary foraging. These farms have semi-natural environmental conditions, sustaining diverse wildlife communities that have complex effects on fish production and also provide a livelihood for many wetland related taxa. Based on their characteristics, these communities could be sources of various ecosystem services (ESs), that could also enhance the value and enable the multifunctional use of these artificially constructed and maintained production zones. To identify and estimate the whole range of wildlife's contribution we have conducted an integrated assessment in an extensively managed pond system in Biharugra, Hungary, where we studied 14 previously revealed ESs: fish and reed production, water storage, water and air quality regulation, CO₂ absorption, groundwater recharge, aesthetics, recreational activities, inspiration, education, scientific research, presence of semi-natural habitats and useful/protected species. ESs were collected through structured interviews with the local experts of all major stakeholder groups, where we have also gathered information about the known forms, levels (none, low, high) and orientations (positive, negative) of the contributions of the wildlife community. After that, a quantitative analysis was carried out: we calculated the total mean value of the services being used between 2014-16, then we estimated the value and percentage of contributions. For the quantification, we mainly used biophysical indicators with the available data and empirical knowledge of the local experts. During the interviews, 12 of the previously listed services (85%) were mentioned to be related to wildlife community, consisting of 5 fully (e.g., recreation, reed production) and seven partially dependent ESs (e.g., inspiration, CO₂ absorption) from our list. The orientation of the contributions was said to be positive almost every time; however, in the case of fish production, the feeding habit of some wild species (*Phalacrocorax carbo*, *Lutra lutra*) caused significant losses in fish stocks in the study period. During the biophysical assessment, we calculated the total mean value of the services and quantified the aid of wildlife community at the following services: fish and reed production, recreation, CO₂ absorption, and the presence of semi-natural habitats and wild species. The combined results of our interviews and biophysical evaluations showed that the presence of wildlife community not just greatly increased the productivity of the fish farms in Biharugra (with ~53% of natural yield generated by planktonic and benthic communities) but also enhanced the multifunctionality of the system through expanding the quality and number of its services. With these abilities, extensively managed fishponds could play an important role in the future as refugia for wetland related services and species threatened by the effects of global warming.

Keywords : ecosystem services, fishpond systems, integrated assessment, wildlife community

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