



BIODIVERSITY CONSERVATION AND MONITORING – ENGAGEMENT AND MOTIVATIONS OF CITIZEN SCIENTISTS

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ABSTRACT: Biodiversity conservation cannot operate in Central Eastern European countries without a well-established monitoring system, that is dependent on the citizen scientists input. Here we analyse, based on a Polish case: (1) The contribution of NGOs to the national nature monitoring scheme and their collaboration with governmental and scientific institutions and (2) the motivation of citizen scientists to volunteer for NGOs' monitoring activities. The study comprises a focus group interview, 30 in-depth interviews with coordinators, citizen scientists, experts and a 23 days long participant observation of a model NGO. We have assessed the monitoring input of NGOs as being a contributory factor influencing the biodiversity conservation effectiveness. The cooperation between governmental, scientific institutions and NGOs exists, but is dependent on national funding. Although NGOs highlight the lack of coherence in monitoring methodology, they are willing to join the biodiversity monitoring, especially at the European Ecological Network – Natura 2000 sites. On the other hand the trust concerning cooperation with citizen scientists is limited. However, despite this, they still turned out to be trustworthy partners. The most effective way to maintain cooperation with citizen scientists is to create a bond in a group and to provide them with the opportunity to develop their passion for nature. Our findings have shed light on the growing importance of citizen scientists in biodiversity governance, providing recommendations for development of the effective monitoring schemes based on the volunteer work of citizen scientists.

KEY WORDS: citizen scientists, volunteering, biodiversity conservation, NGOs, monitoring, Central Eastern European Countries.

INTRODUCTION

Currently, one of the most effective legislative tools in biodiversity conservation in Europe is the Habitats Directive. The EU Member States are obliged to monitor and supervise the degree of natural habitat protection and the species mentioned in the Directive. The need for data concerning the condition of the natural environment derived from monitoring, is reinforced by the reporting obligations required under the Convention on Biological Diversity, as well as the Biodiversity Action Plan and Council Directive 92/43/EEC on the conservation of natural habitats, wild fauna and flora (Radziwiłł 2006; Warren, Witter 2002). In the case of the EU, Poland included, most monitoring schemes operate at a national or sub-national scale; their approaches and methodology vary between and within each country. In practice it is often a decentralised activity remaining within the interest and competence of many institutions, i.e., NGOs, scientific institutions, and informal groups based on volunteer work, as a result of cooperation between various entities (Marsh, Trenham 2008; Schmeller *et al.* 2009).

As a result, there is often no coherence in the way the data is recorded and assessed. Another problem is the cost of the monitoring activities performed by professionals. For this reason, much of the data required, at least in case of the EU and Poland, must come from existing data. All these circumstances make it very difficult for researchers and managers to obtain an overall picture of the condition of nature in a particular area. The search for optimal solutions for standardising nature monitoring programs though has become a significant challenge for social science research (Cent *et al.* 2013, Niedziałkowski *et al.* 2016; Niedziałkowski *et al.* 2018; *Science for Environment Policy* 2015).

The monitoring of progress towards EU-level biodiversity goals is therefore heavily dependent on various EU frameworks already established and the capacity of the monitoring institutions to carry out these functions over the long-term (Donald *et al.* 2007, Ellwanger *et al.* 2018). Furthermore, most of the monitoring regimes are greatly dependent on volunteer input. The countries where a biodiversity monitoring system had not previously existed at the time of the Convention on Biological Diversity, such as in Poland and other CEE countries, are also restricted by logistical constraints and political factors. Reliance on a small group of professionals is also frequently associated with delays in data handling or even failure to deliver reports on the condition of the studied population (Bennun 2001). An alternative method to conducting monitoring seems to be the involvement of lay-people, volunteers, or other groups of people involved in a broad community science

activities (Bell *et al.* 2008; Gordzińska-Jurczak, Cent 2011; Danielsen *et al.* 2005, Gray, Kalpers 2005). Without the assistance of these groups, the achievement of internationally set goals concerning nature may be difficult (Tikka, Kauppi 2003; Jollymore *et al.* 2017).

Within the very complex political structure of the EU, NGOs became an important player in the political arena, which involved participating in the education of society and playing an active role in the formulation and implementation of environmental directives (Bath 2005; Bell *et al.* 2011; Turnock 2001). Such an enhancement of biodiversity monitoring system requires not only formal possibilities (e.g. accepting NGOs in public tenders or engaging unpaid volunteers in work of public institution) which are already in place in case of EU and Poland. Equally important are: acceptance of active role of NGOs in biodiversity policy making and their influence on implementation of conservation policies, as well as understanding of how volunteer and natural scientists networks may be regarded as credible partners in collecting data for monitoring and evaluation of the state of biodiversity conservation programs. Understanding motivations why and how to volunteer for biodiversity monitoring is also crucial for further development of the scope of such activities and its role in the state's monitoring system of environment.

In this paper we present an analysis of the role of NGOs and volunteerwork, particularly of citizen scientists, within the Polish nature conservation sector, focusing on:

- NGOs input to the national environmental monitoring programmes and their cooperation with governmental and scientific institutions,
- the motivation of citizen scientists to undertake and continue volunteering for a given non-governmental environmental organisation.

By addressing this two issues we cover two crucial types of interaction between actors within monitoring data collection schemes: the state – NGOs interaction that shapes the scope and role of citizen scientists in monitoring, and NGOs – volunteers interaction that underlies quality of data collected by citizen scientists and is crucial for the future development of volunteer-based monitoring schemes. By citizen scientist we mean a person who has not necessarily received education in the natural sciences (although it might be a student of a natural sciences faculty or a person with education in natural science who currently is not professionally engaged in research or monitoring activities) and who is voluntarily involved in environmental activities driven by their interests, developed independently or shared in a group (Lawrence 2006). In the entire text we use a term of “citizen scientist”, although still in the Polish wording other expressions are commonly used. These include amongst others: amateur naturalist, NGO volunteer, ECO-NGO volunteer, or simply a volunteer with a passions for the environment.

METHODS AND ANALYSIS

We present the results of a three-stage qualitative study conducted from 2007–2009 in Poland, consisting of Focus Group Interview in-depth interviews and participant observation. Qualitative methods were selected in order to provide an in-depth view on functioning of NGOs and volunteers in monitoring schemes. Qualitative methods allowed us to look beyond official information on the engagement of NGOs or current numbers of NGOs and volunteers in monitoring programs, and focus on hidden and complex issues in relations between state, non-state actors and volunteers. They enabled us to present results based on personal experiences and stories of people actually involved in the monitoring schemes with actual or potential contribution to the Polish state and EU biodiversity monitoring system.

The first stage of the study was a Focus Group Interview (FGI) with representatives of six Polish NGOs (each of whom had at least several years of experience in working with volunteers active in biodiversity conservation) and two scientific institutions that were analysis data collected by volunteers. The FGI took 1.5 h, was conducted by a facilitator using an interview guide prepared beforehand, and was recorded, transcribed, coded and analysed in order to identify methods of engaging citizen scientists and to assess if tasks appointed to volunteers were different between organisations.

The second stage of the study were 30 in-depth interviews conducted in seven Polish NGOs, an academic institution cooperating with NGOs (Institute of Nature Conservation of the Polish Academy of Sciences) and 2 nature conservation administration bodies (General Directorate for Environmental Protection, Ministry of the Environment). The interviews were semi-structured, lasted ca. 1.5 h and were conducted using guides covering all aspects of public participation in biodiversity monitoring (Berg, Lune 2016).

The third stage of the study comprised informal interviews and participant observation in the selected model organisation. Participant observation allowed us to assess the individual experience and motivation of volunteers and NGO members and to determine the variables affecting the diligence applied in task performance and length of time citizen scientists were involved in monitoring activities in a particular group. The ethnographic study was conducted using participant observation for 23 days with the research group Akcja Carpatica, which at that time had been monitoring for more than eight years and performs monitoring activities on a regular basis, as well as preparing and transferring monitoring data freely available to scientists.

The interviews were transcribed, collected material was divided into thematic sections (sentences or longer statements), and codes (detailed key topics) were assigned to each section. The ethnographic notes made during participant observation were systematised in the same way. Subsequently, the transcription and observation material was organised by codes and summarised for the purposes of this study. Coded segments were originally grouped in a two-dimensional tabular format, with the respondents arranged in rows with the most important issues raised during the interviews summarized in the columns by codes.

RESULTS

NGOs' INPUT TO THE NATIONAL ENVIRONMENTAL MONITORING PROGRAMMES

According to the respondents, the current biodiversity conservation and monitoring scene in Poland is rather, in many aspects, poorly organized and governed. The overall level of conservation activities (monitoring included) could not have been completed without the strong and continuous contribution of NGOs. NGOs actively co-operate with scientific institutions and governmental bodies and are regarded by the latter as trustworthy mainly due to the knowledge, interest and passion for nature and research of their members and volunteers. However, both NGOs and state institutions identify many barriers, such as funding limitations, logistics and capability to complete desired large-scale biological monitoring programmes, as well as incoherent methodology currently used by various organizations in nature monitoring.

Employees of scientific institutions and nature conservation management bodies emphasised in the interviews the need to initiate several forms of coordination of monitoring, selection of proper specialists, and the execution stage. Interviewed scientists were of the opinion that the coordination of virtually all tasks could be entrusted entirely to scientific institutions. Their responsibilities would include developing monitoring methodologies, supervision of data collecting, controlling verification of data obtained by NGOs, sharing data and results with the Ministry of the Environment.

The representative of a governmental institution indicated the need to appoint local coordinators of monitoring and declared a readiness to cooperate with scientific institutes and specialists from the national parks. The form of selection of the specialist coordinators and the establishment of their respective responsibilities by the ministry, were regarded by a representative of a scientific institution as being rather vague. The financing of specific monitoring undertakings was believed to be the most difficult problem in terms of the cooperation between the ministry and scientific institutions. Nevertheless, the NGO activists feel a strong need to promote themselves and increase the trust in their competences.

Respondents from NGOs also believe that the cooperation between NGOs, state and scientific institutions, involving monitoring activities and data transfer can only be effective if the ministry has adequate funding at its disposal. In many cases, a contract covering the performance of specific nature monitoring tasks is not signed for reasons that remain unclear for NGOs. Such situations undermine the trust in the cooperation between NGOs and the Ministry of the Environment. The research conducted in a particular area is often only a small fraction of what needs be performed in order to gain a full picture of the conservation status of a species or habitat on a national scale. Not only organisation leaders, but also citizen scientists, are aware of the issue, e.g., 'There is another problem with monitoring, a very simple and obvious one, namely, a financial problem. There are a lot of specialists, but there is no money. If somebody deals with a certain area, such as working with wolves, then one registers all the rare

species during the monitoring. When this information is later needed somewhere else, one takes it out (...) Solid monitoring, by which I mean long-standing research, leaves much to be desired, in my opinion (...). There is lack of coordination. (...) This is a similar situation to that of the national biodiversity network. This network has a lot of big, empty loops. (...) Everybody has their own territory where they do something – some more ambitiously, while some limit themselves to counting’ [NGO member]. According to the NGO representative, other mentioned causes of problems with initiating cooperation often relate to the lower predictability of the actions taken by NGOs, compared to that of governmental bodies, i.e., the State Forests.

According to the respondents’ experiences, cooperation between scientific institutions and NGOs involves the following: the use of methodological guidelines developed by scientific institutions in NGOs’ plans of the monitoring activities; co-authoring publications; delivering data from NGOs to scientists for analysis; as well as the regular cooperation of scientists and citizen scientists volunteering in NGOs in conducting various monitoring activities. The knowledge NGOs experts (employees or long-term members) of the local environment may be a valuable supplementation to scientific knowledge. Scientists indicated their lack of experience in entrusting specific responsibilities to entire non-governmental organisations. However, they considered both the data and the interpretation of data by NGOs to be trustworthy. They also mentioned the need for knowledge-based supervision of the work performed by citizen scientists.

The representatives of NGOs generally regard the level of cooperation between NGOs and scientific organisations to be effective, if it is based on former experience of joint work in the field or the coordination of projects, which have generated mutual trust. Another aspect, not included by scientists but noted by NGO representatives, was the lack of uniformity in the methodology, which makes it impossible to compare data collected by various NGOs. An NGO representative opinion, also shared by other respondents, exemplifies a vision for responsible and future-oriented approach to nature monitoring in Poland. The coordination of monitoring is believed to be a prerequisite for effective nature conservation, e.g., ‘If something else is missing, apart from money, (...) it is coordination and cooperation, and above all, it is a single core unit, which would generally decide at what level the monitoring should be done and which groups it should include’ [NGO member].

According to a representative of a scientific institution, certain nature monitoring tasks can be delegated to volunteers on the condition that specialists coordinate their work. The role of volunteer workers is particularly appreciated because of their passion, which enables them to conduct research in difficult conditions. For instance, their involvement in the monitoring of common breeding birds and of the Natura 2000 sites is regarded as significant for the success of these initiatives. Respondents involved in monitoring as volunteers believe that the voluntary character of this work guarantees its reliability, e.g., ‘A volunteer does something because he or she wants to do it and that is why they will do it well. If they do not want to participate, they simply will not volunteer, and somebody else will come.’ [volunteer]. This opinion was also shared by other members

of NGOs and scientists, who also indicated the importance of volunteers' experience in fieldwork and quality and intensity of the training they have received from experts.

MOTIVATION OF CITIZEN SCIENTISTS TO UNDERTAKE AND CONTINUE VOLUNTEERING FOR ENVIRONMENTAL NGOS

The study provided four categories relevant for understanding the motivations of citizen scientists in nature monitoring:

- the reasons for engaging citizen scientists in environmental activities by particular NGOs,
- the expectations of organisational leaders in relation to amateur volunteers,
- the motivations of amateur volunteers in joining the activities of a particular organisation,
- the ways to motivate amateur volunteers to ensure active and long-lasting participation in the work of an organisation.

The participants of FGI distinguished two types of organisations based on the different reasons given for engaging volunteers. The first type assembles people because they are necessary to carry out a plan created by a small group of founder members. The contribution of volunteers is essential for the performance of the tasks and appreciated due to its direct, practical input to the organization's objectives. The second type of organisation gathers people with similar interests, concentrating on a particular idea. These people then decide as a group how to put an idea into practice. Sometimes, the purpose and working methods of the second type of organisation gradually become more focused. Once this happens, the reasons for which they engage volunteers tend to mirror the reasons characteristic of the first type.

Two approaches to the recruitment of volunteers used in the NGOs have been distinguished by our respondents, e.g., 'There are organisations that absolutely must not select or reject people. There are also organisations that must because it is in their nature to do so' [NGO member]. The persons representing the first type of organisation described their work with volunteers using the following phrases: 'volunteers are needed in this work'; 'volunteers help, for example in carrying out projects, classes, contests'; 'volunteers come along to the head office all the time, and help carry out projects'; 'more people have been drawn to cooperate'. The recruitment of volunteers usually includes 'some method of selection' or 'some kind of competency selection'. Organisations of the second type can usually be accessed by volunteers without any selection process, e.g., 'Everybody is admitted'.

An important role in the development of the second type of organisation is played by competition, e.g., 'There should not be only one person who can speak and all the rest who listen. There should be somebody else who challenges. In this way, everybody has a say and that is what keeps us moving forward' [NGO member]. The second type of organisation functions in a way that allows everyone to make an equal contribution regarding initiatives and ideas, e.g., 'We tend to organise spontaneously. We look for research problems that we can work on' [NGO member].

Organisation leaders, interviewed in the study and participated in the FGI, had often clear expectations concerning the persons who decide to become involved in activities, which they categorised as follows: (1) education, (2) knowledge of nature or willingness to gain this, (3) commitment and activities, (4) interest, and (5) sharing ideas and views. Subsequently, the categories of motivation for public involvement in nature conservation have been determined, based on interviews with volunteers. Based on these, the following types of volunteers have been distinguished: (1) Enthusiasts and activists, (2) Volunteers seeking a group, (3) Knowledge extension seekers, (4) Aspirants with high objectives, (5) Experience collectors, (6) Trainees, and (7) Tourists. Each of these groups has their own relevant motivations for joining such an organisation (Tab. 1). They include motivations related to individual joy and fulfilment, as well as bonding with other and feeling of doing something important for the community e.g. ‘They’ve got a feeling that they do something for themselves, for society’; ‘It gives me such great joy, satisfaction, but in a very personal way’ [volunteer]. In time, with deeper involvement with the organization and more frequent interactions with other NGO’s members, volunteers started to identify with both the organization’s goals and the volunteering itself, e.g., ‘Volunteering is a kind of a lifestyle, actually. It is also a way of getting to know the world, to know yourself, to know other people’; ‘If we have people who continue this activity for 23 years, this is the idea of their life’; [volunteer]. During the participant observation, the organisers defined a breakthrough in volunteer involvement, as the point when volunteers begin referring to everything in the camp as a common property (“our”); it is at this point when they begin to identify themselves with the organisation.

Table 1. Motivations of different groups of volunteers to work for organizations

No.	Volunteer type	Motivation type
1.	Enthusiasts and activists	Desire to help; putting an idea into practice; doing something important, passion
2.	Volunteers seeking a group	Looking for people with the same interests; willingness to be in contact with others; friendships; knowing new people
3.	Knowledge extension seekers	Desire to gain knowledge; desire to gain practical knowledge; development of research interests; acquiring knowledge through practice; extending knowledge
4.	Aspirants with a high aim	Achieving a previously set goal; willingness to work, learn something new and gain particular qualifications
5.	Experience collectors	Gaining experience; curiosity
6.	Trainees	Gaining experience to get a better job in the future; compulsory traineeship during studies; present one’s skills as a potential job candidate, receiving a certificate of employment
7.	Tourists	Visiting interesting places; accompanying another person; way of spending one’s holiday

There are many ways used to motivate volunteers for a long and active involvement in the work of an organisation. They have been summarised in Table 2.

Table 2. Ways of motivating volunteers to long-term and active involvement in the organization

No.	Ways of motivating volunteers	Motivation type
1.	Passion of a leader	Instilling passion; individual dedication
2.	Frequent contact and availability of information	Individual contact; informing of current events and results via website
3.	Individual approach to volunteers	Taking individual needs into account; engagement relevant to individual predisposition; respect; verbal communication; non-verbal communication; chance for employment
4.	Organization of integration meetings, creating bonds in a group	Summary meetings and planning meetings; additional trips; being together
5.	Training and ensuring access to knowledge	Ensuring access to people or places which help promote knowledge and experience; training
6.	Delegation of responsibility	Tasks; delegation of responsibility for the performance of projects; creating conditions for volunteers to develop their own research ideas
7.	Rewards	System of distinctions; small prizes; free-of-charge publications

The participants of the group interview formed a list of guidelines on how cooperation with volunteers should be initiated to make it successful. The guidelines have been classified into five categories: motivating, investment of time for training volunteers to work, strategy, goal and plan for action, and personality traits of organizational leader. They are presented in Table 3, illustrated by statements from FGI participants.

DISCUSSION

COOPERATION BETWEEN NATURE MONITORING INSTITUTIONS AND NGOs

Numerous studies carried out to date have shown that the effectiveness of biodiversity conservation is higher if it is based on the coordinated actions of local institutions, rather than in a situation when all relevant decisions are made at the central level (Chuenpagdee *et al.* 2004; Gibson *et al.* 2000; Hulme, Murphree 2001; Sullivan, Mores 2015). Other factors affecting efficiency is the need to exchange views and experiences between those who create policies and conceptions and those who implement them (Piper 2005; Costa *et al.* 2018). In this study, cooperation in monitoring activities was declared by almost all of the investigated institutions, similarly to transferring the data

Table 3. Guidelines on how to initiate successful cooperation with volunteers

No.	Guideline	Quotations of FGI participants
1.	Motivating	<i>'In the initial phase of organizational activity, it is very important that the approach should, as much as possible' be highly individual.</i>
2.	Investment of time for training volunteers to work independently	<i>'The only inconvenience is time. (...) It takes a lot of your commitment, effort, and so on, to win these people over, to cooperate with them, and teach them'; 'The thing that you also need to teach them [volunteers] is independence, so that they should know that the piece of work belongs to them and have a vision of it. It is important that they take care to establish whether they have a future in this organization or in another'.</i>
3.	Strategy	<i>'these people come and go, because they consider it temporary (...). That is why it is useful to divide the work into small bits. Each person is responsible for their part. Of course, sometimes it is impossible, but it is usually possible to pass on the results to the next person'</i>
4.	Goal and plan of action	<i>'You should specify the goal very precisely. If it turns out to be too extensive, reduce it slightly at the beginning. Next, you should revise your capacity, which means you divide your human resources at the start by two. Then you can get down to organizing something'; 'I think it is very important to determine the goal, a sort of plan of action, so as to know what projects are to be considered'</i>
5.	Personality traits of organizational leaders	<i>'A person who will represent it with their life should be exemplary, calm, staid, but not combative. The latter is very important for such people'; 'It is necessary to be genuine in what you do. Then you will draw the right people to you'; 'In my opinion, it cannot be handled by a single person. There should be at least three people with great passion and motivation to work. They will be able to get things going in the organization. And I do not think we can rely solely on volunteers'</i>

and making it generally available to governmental and scientific institutions, as well as other NGOs. Investigated institutions were ready, although with some limitations, to delegate the responsibility for specific monitoring tasks to one another, to jointly perform these tasks, to exchange the data obtained from nature monitoring and to assess their quality; this emphasises the need to create several types of coordination, which would cover the conception of a monitoring scheme, the selection of suitable specialists, and the conducting of actual field work. The respondents' statements with regard to the need for cooperation in information exchange between the Ministry of the Environment, academic institutions, and NGOs support this fact underlying the need to manage the problems of increasing trust in collaborations between organisation.

Generally speaking, NGOs actively influence changes in national environmental policies, also through their involvement in planning and conducting biodiversity monitoring (Coenen *et al.* 1998; Potter 1996; Wahlén 2014). In Great Britain, for instance, the cooperation of NGOs such as the Royal Society for the Protection of Birds with

governmental bodies resulted in the formulation of nature protection laws (Lowe, Goyder 1983). In the USA, a network of organisations enforced the Convention on Biological Diversity, with particular focus given to species protection (Jutro 1994; Conrad, Hilchey 2011), whilst Australian NGOs are members of Australia's Endangered Species Advisory Committee (Eyre *et al.* 2011; Nias 1995). The historical conditions in the countries of Central and Eastern Europe hindered the possibility of instigating such types of permanent and successful cooperation for many decades, until political changes in the 1990s and more recent enlargement of the European Union (Klůvankova-Oravska *et al.* 2009). In majority of the CEE countries, the transformation from a model of strongly centralised power based on control and dominating by state property, towards democratic rule with property privatisation, requires a longlasting process of changing the institutional structures, traditions, and habits (Balashenko *et al.* 2005; Lazdinis *et al.* 2007). The transitional phase typically involves disruption to the decision-making speed at ministerial level, law implementation, flow of information, and efficient transfer of knowledge (Eikeland *et al.* 1994; Jansky *et al.* 2004). The present study has indicated exactly these problems as an impediment to commencing effective cooperation.

The creation of community networks connecting institutions and organisations dealing with biodiversity conservation on a different scale and to a different extent, could significantly facilitate the transfer of information, reveal gaps in knowledge, and create a sort of body of know-how in ecosystem management (Olsson *et al.* 2004). Similarly, a significant role in paving the way for such a structure in Poland could be played by scientific institutions willing to engage with both public administration and NGOs (Strzelecka *et al.* 2016). The Institute of Nature Conservation of the Polish Academy of Science was listed as prepared to coordinate monitoring with strong scientific support and cooperate with a team of experts and is well informed on the activities of the Ministry and the scope of NGOs.

BIODIVERSITY MONITORING AND CITIZEN SCIENTISTS

Volunteerism is an important element in the functioning of societies. It may provide solutions to problems that remain unsolved at national or local-government levels (Lindenmeier 2008). In Poland, the actual green movement started to develop in the late 1980s after the collapse of communism and has been developing rapidly since then (Gliński 1996), although this has not necessarily been in step with a real change in people's environmental awareness. That is why in the early nineties, the newly established branches of international organisations in Poland, such as Greenpeace or Birdlife International, stemming from Western European or North American culture, found it hard to recruit volunteers, or identify and involve citizen scientists in their actions (Vandzinskaitė *et al.* 2010; Voicu and Voicu 2003). Numerous social science studies demonstrate a strong improvement in the situation in the last decade (Boakes *et al.* 2016; Bell *et al.* 2011; Blicharska *et al.* 2016; Juknevičius, Savicka 2003), indicating the personal motivations as the crucial factor encouraging citizen scientist

to work for a particular NGO. The motivation plays a significant part with regard not only to the duration of a volunteers' cooperation with a particular organisation but also in the way they perform their work (Grodzińska-Jurczak 2018; Mowen, Sujan 2005; Nassar-McMillan, Lambert 2003). In the results of the our study, the volunteers' motivations were compared with the motivating methods used by the organisers, showing that NGOs' expectations towards volunteers may not only accompany, but also significantly increase volunteers' enthusiasm.

The levels of organisation activity referred to in the above statement can be associated with the stages of volunteer service described by Omoto and Snyder (1995). They specified the stages as follows:

- the stage of antecedent circumstances related to the volunteer's past, which affect their motivation to become initially involved in the activities of any organisation;
- the ability to gain experience while volunteering, which in turn influences the decisions concerning the continuation of previously commenced activities;
- the consequences or results of long-standing involvement, that shape their views on volunteerism and on the organisations involved, which then affects the decision to resign or continue cooperation with the organisation.

The same authors have also defined three levels of motivation (individual, organisational, and societal) that are present at each of the abovementioned stages. Based on our study, we can suggest that in the organisations comprised solely of citizen scientists, who are investigated in this paper, the levels of motivation accompany the various stages of volunteer service.

The motivations at the first stage reflect life aspirations, plans, and goals (Snyder, Cantor 1998). Knowing them helps to enhance motivation in candidates who consider joining in the organisation's activities (Clary *et al.* 1994). At the second stage, satisfaction and integration with a group begins to play a significant role. They are connected with one another, and these aspects affect the relationship between individual and organisational motivation and the duration of involvement. The interdependence between them increases with time (Marta, Pozzi 2008), when volunteers increase their time contribution to the organization and more frequently interact with other NGO members or employees. The number and quality of interaction that emerge during the work in an organisation have an influence on the sense of satisfaction from this work and integration with the group. Interactions between individual volunteers and organisers have been believed to be the most important (Omoto, Snyder 2001). By analysing the motivating methods of NGO leaders in our study, we can suggest that organisers are aware of these interplays, and intentionally maintain good and frequent relations with citizen scientists in order to improve the volunteers' work quality. At the third stage, the volunteers' involvement determines their identity in society. Persons engaging in volunteer service identify themselves with the role of community worker. It is especially important factor in the case of young people, and it develops on the basis of values shared in the group, motivation to work with others, and the degree

of integration and satisfaction inside an organisation (Marta, Pozzi 2008). Therefore, the longer the duration of volunteer work, the greater the motivation and willingness to perform tasks for the organisation (Piliavin *et al.* 2002). In our study, NGO leaders seemed aware of this phenomena and valued the most volunteers who were engaged in the organization for a longer period of time.

The task of organisers is not only limited to successful recruitment of volunteers but also includes working towards maximisation of their involvement as well (Penner 2002; Troutman *et al.* 2000). Some leaders have tried to achieve this through entrusting responsibility to volunteers. Another division of motivation is the distinction drawn between altruistic and egoistic motives (Cnaan, Goldberg-Glen 1990). The first type of motivation determines more lasting involvement in the organisation's activities compared to motivations based on particular interest of individuals. In the present study, this first type of motivation was defined as a willingness to offer help and was assigned to the enthusiast and activist types of volunteers. The second type of motivation includes improving professional skills and training (Zakour 1994); in the present study, it marked the trainee type of volunteers, which frequently characterized students in natural sciences. This is typical of young people entering the labour market (Omoto *et al.* 2000). Another example of egoistic motivation is personal development (D'Braunstein, Ebersole 1992), not related to professional skills. Similar motives were found in our study and assigned to the type of volunteers with high aspirations. Considering these types of motivation, Nassar-McMillan and Lambert (2003) stressed the importance of the training provided by the organisations, not only at the beginning of cooperation with a volunteer but also later, taking the volunteer's specific skills into account. Our study demonstrated that this type of motivation elevates both the degree of volunteer's involvement and willingness of NGO members to share knowledge and specific skills with volunteers. Monitoring organisers in our study were well aware of this aspects, e.g. encouraging volunteers with scientific passion and ambitions to pursue their master or doctoral research as a part of the NGO activity.

CONCLUSIONS

Biodiversity conservation is based on governmental institutions and academic experts as well the broad involvement of NGOs based on the work of volunteers – citizen scientists. Although the potential of all three bodies is regarded as crucial, its practical exploitation and cooperation encounters major obstacles. This is chiefly due to the lack of state funding for the participation of NGOs, as well as the incoherent methodology of nature monitoring or the coordination of actions that could lead to its improvement. It therefore seems legitimate, both in the opinion of academic entities and NGOs interviewed in this study, to establish an institution coordinating all national nature monitoring programmes. The elaboration of a new model for successful

cooperation between NGOs and governmental bodies requires further studies to determine the expectations of these institutions concerning their mutual cooperation and planned achievements, as well as recommendations on how to engage potential citizen scientists in nature conservation tasks.

This study shows that, although ‘citizen science’ in the field of nature conservation does not have a long tradition in Poland and other CEE countries, contrary to the old EU Member States, its’ activity and involvement becomes significant resulting in the increase of NGOs’ involvement in implementation of biodiversity policy. In order to ensure credible and stable monitoring networks of citizen scientists, it is important to develop not only formal institutional frameworks, but also provide volunteers with the opportunity to develop their passion for nature, access to knowledge, bond with others through volunteering activity, and contact with people with long-standing work experience in nature monitoring. The usefulness of citizen scientists depends also on how they meet the expectations of the leaders of individual NGOs, but also expectation of NGOs may either encourage or hinder motivation to volunteer.

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