Land Use Policy 141 (2024) 107136

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Why is the eutrophication governance over the Lake of Baikal failing? Land use governance solutions need to account for barriers across sectors, scales, and actor groups

Anton Shkaruba [a], Ruben Mnatsakanian [b,*], Irina Molodikova [b], Viktar Kireyeu [c], Kalev Sepp [a]

[a] Estonian University of Life Sciences, Tartu, Estonia
[b] Central European University, Vienna, Austria
[c] Erda RTE, The Hague, Netherlands

ARTICLE INFO

Keywords:
Eutrophication governance
Socio-ecological systems
Land-use change
Hospitality industry
Coastal areas
Lake Baikal

ABSTRACT

In this study, we examined the failure of Russia's environmental governance to prevent the nutrient load generated by littoral households and tourism businesses from reaching Lake Baikal. It is important to note that this failure has occurred even with sufficient implementation capacity and demonstrable political will to protect this body of water. This research inquiry into the 'eutrophication governance' of Baikal was based on field analysis of management issues, institutions, and actors concerned with the island of Olkhon and was further 'triangulated' and completed using desk research targeting the broader institutional framework and actors' discourses. On one hand, the study of the island's socio-ecological system demonstrated that governance solutions developed by the Federal Government to curb Baikal's eutrophication do not constitute a coherent set of measures targeting various stakeholder groups using an applicable repertoire of policy instruments. On the other hand, many local actors oppose the conservation agenda, and in doing so, they are actively making use of any gaps and inconsistencies in the eutrophication governance regime. This difference has resulted in a high level of conflict among key actors that is spreading across all policy levels. Successful solutions could be based on an inclusive and transparent policy elaboration aimed at resetting existing conservation tools to more acceptable ones with a parallel "ratcheting up" of enforcement and monitoring, which are grossly underpowered at the moment. This resetting process needs to be targeted by adequate capacity-building efforts. The greatest challenge, however, is to address the inconsistent and confusing signals regarding the protection of Baikal originating from high-level policies.

1. Introduction

Of all the diversity of environmental policy implementation deficits described in the literature, perhaps the most curious cases are instances in which deficits develop despite the high multi-actor consensus over the importance of resolving these problems and an adequate capacity to resolve such issues. In more obvious instances, such deficits might occur due to the high complexity of biophysical systems interplaying with challenging socio-political contexts, which have often been framed as "wicked" problems (Peters, 2017; Shkaruba and Skryhan, 2019; Termeer et al., 2019; Turnbull and Hoppe, 2019). In situations in which problems can be proven to be manageable, implementation deficits are usually attributed to governance flaws or to instances of non-governance caused by imbalances in power relations and actor networks (Emerson, 1962; Molm, 1990) to institutional misfits (Moon, 2019; Bastos Lima et al., 2019) or to the overall robustness of governance frameworks (Järv et al., 2021).

The eutrophication of Lake Baikal in Russia can serve as an example of the latter case. Eutrophication is an important problem that is exacerbated due to various human activities and climate change (Brown et al., 2021; Kravtsova et al., 2014, 2019; Kobanova et al., 2016) despite numerous policies targeting impactful activities in the littoral zone and the immediate watershed (Timoshkin, 2018). Importantly, Baikal is universally recognised in Russia as one of the most iconic natural heritage sites nationwide (Timoshkin et al., 2016; Korytny and Evstropyeva, 2018). It enjoys multi-stakeholder consensus regarding the importance

* Correspondence to: Central European University, Quellenstrasse 51, Vienna 1010, Austria.
E-mail address: mnatsaka@ceu.edu (R. Mnatsakanian).

https://doi.org/10.1016/j.landusepol.2024.107136
Received 4 May 2021; Received in revised form 20 January 2024; Accepted 5 March 2024
Available online 15 March 2024

of its protection (Nikitina, 2016), and its protection is duly recognised as a top priority policy objective as demonstrated by dedicated legislation, federal programs (TASS, 2016, 2017; Appendix B: FLSDRF, 1999; DGRF, 2006), and numerous statements by heads of the state (Sandle, 1998; Vedomosty, 2017). Furthermore, no doubt that sufficient research and organisational and financial capacities of the Russian Federation to curb nutrient load exists, while the problem is known as a manageable one judging from well-described cases, such as the successful de-eutrophication of the Great Lakes (Scavia et al., 2014) or Lake Balaton (Istvánovics et al., 2007; Bernat, 2020).

Most of the current nutrient load on Baikal can be attributed to the significant increase in tourism and the hotel/restaurant/catering (HORECA) sector during the recent decade, which is essentially a land use governance issue (Tsvigun et al., 2020). This study, therefore, aimed to explore the specific barriers and enabling conditions for environmental policy objectives related to nutrient load reduction in Baikal due to HORECA activities. In doing so, we refer both to how a littoral socio-ecological system interfaces with governance framework conditions and to changes occurring in governance regimes due to such interactions. We combined a helicopter view of Baikal-related policies and power relationships around such policies with an in-depth analysis of management challenges, actor networks, and conflicts in a specific location within the littoral zone that is also the focus of various environmental protection policies that have been established to protect the lake.

Our inquiry further raises the problem of critical flaws in the specific policies of 'eutrophication governance' over Baikal. Our inquiry pertains to the global importance of this water body and the apparent gap in the international literature, which lacks systemic overviews of institutional landscapes of governance over natural resources in Russia.

2. Conceptual framework and methods

2.1. Conceptual framework

When examining our eutrophication governance case, we started with the concept of socio-ecological systems (SESs). When proposing this concept, Gallopín et al. (1989) emphasized the capability of SESs to sustain themselves and later also added properties, such as complexity, constant change, 'inherent unpredictability,' interconnectedness, and 'irreducible uncertainty' of interactions within such systems (Gallopín, 1994). While analysing institutions in the context of common-pool resources (CPRs), Elinor Ostrom (1990) developed the generic properties of successful institutions (also widely known as *institutional design principles*). Building on Ostrom's work and further exploring specific successful governance solutions, Paavola (2007) proposed generic environmental governance functions. These functions can be organized based on different governance solutions yet are found to be maintained in systems with reasonable social and environmental objectives and flawed in systems with ongoing conflicts over natural resources. Seven functions were described:

1) exclusion of unauthorised users (how effectively unauthorised users can be excluded);
2) regulation of authorised resource uses and distribution of their benefits (how the level of appropriation of resource units and their distribution is formulated and governed);
3) provisioning and the recovery of its costs (what are the rules for good provision and cost recovery and how effective they are);
4) monitoring (what is monitored and by whom);
5) enforcement (who can participate in environmental decisions and how and which procedures should be observed in decision-making),
6) resolution of conflicts over resource use (what are the conflict resolution mechanisms and how affordable they are), and
7) collective choice for the modification governance solutions (which collective choices are supported/triggered and how).

We view our local eutrophication governance case study as a focal action situation, namely specific instances of managing subsystems within and beyond a given SES, which manifest the complexity of institutions and actor networks dealing with natural resources in specific biophysical contexts, including up- and down-stream situations (Ostrom, 2009).

To expose a full range of institutional barriers of diverse origin and nature, we adapted Paavola's (2007) generic governance functions (recognising their universal character and suitability for CPR systems) and analysed them in terms of governance frameworks (specific, purposive governance interventions that are developed and delivered by multiple actors on multiple scales in pursuit of a broad goal) and regimes and broader governance regimes, which encompass the whole range of customs, norms, and rules that form a particular aspect, such as the actual eutrophication status of Baikal (Paavola et al., 2009). Using this method, we accounted for such SES characteristics used in the Institutional Analysis and Development framework (IAD) in terms of biophysical conditions, attributes of community, and rules-in-use (McGinnis, 2011) as they deal with management challenges, networks of actors and coalitions, and regulatory frameworks and local rules.

While examining compliance issues from the federal policy implementation perspective, we noted that the emerging polycentricity of natural resource governance in Russia can play a significant role in vertical (when policies are not translated into practices after transfer at lower levels) and horizontal (when local actors rank their own priorities over those of higher-level actors) disintegration of such policies (O'Toole and Hanf, 1998) as demonstrated by numerous policy transposition studies in the EU (Leventon, 2014; Gollata and Newig, 2017; Hudson et al., 2019). The seven generic functions underline the multi-layer structure of resource governance systems related to complex governance solutions associated with each given resource; in turn, the solutions exhibit variable degrees of fit to their biophysical and social contexts, such as in terms of function, timeliness, and spatial characteristics (Folke et al., 1998; Paavola et al., 2009). In this study, we attempted to expose the structural constraints of the overall architecture of eutrophication governance over Baikal. The fit/misfit analysis from Baikal was compared to Belarus in which a comprehensive analysis of conservation policies was previously conducted following a similar framework (Shkaruba and Kireyeu, 2013). Belarus is an obvious choice because it emerged from the same Soviet system and followed a similar trajectory in the post-Soviet era.

The overall methodological framework is shown in Fig. 1.

2.2. Case study area and data collection

Our analysis was performed using the case study approach. For our "helicopter view" we chose the island of Olkhon (Fig. 2) because most of its large (730 km^2) territory is undergoing extensive tourist sector development that has expanded recently and caused a fundamental restructuring of its SES (Fig. 3). These developments only started in the 2000s, so their characteristics and dynamics are fully associated with Russia's current political and socio-economic dynamics. At the same time, Olkhon is a key recreational area near the lake, and this littoral SES is responsible for a significant share of nutrient transport to Baikal (Bondarenko et al., 2023). Importantly, Olkhon is the land of the Buryat people, whose traditional lifestyles were disrupted by Russian colonization, Gulag, fisheries, and later tourism development. Most of the local population is Buryat, including small property owners and tourist service operators.

The SES data were collected using 60 in-depth interviews with owners of accommodation facilities and other local businesses, national parks and municipal officers, non-governmental organisation (NGO) representatives, academics, and island visitors (see Appendix A for details). The interviewees were identified based on the preliminary list of key actors after which snow-ball sampling was used. HORECA owners were approached by a team of interviewers who tried to speak with each

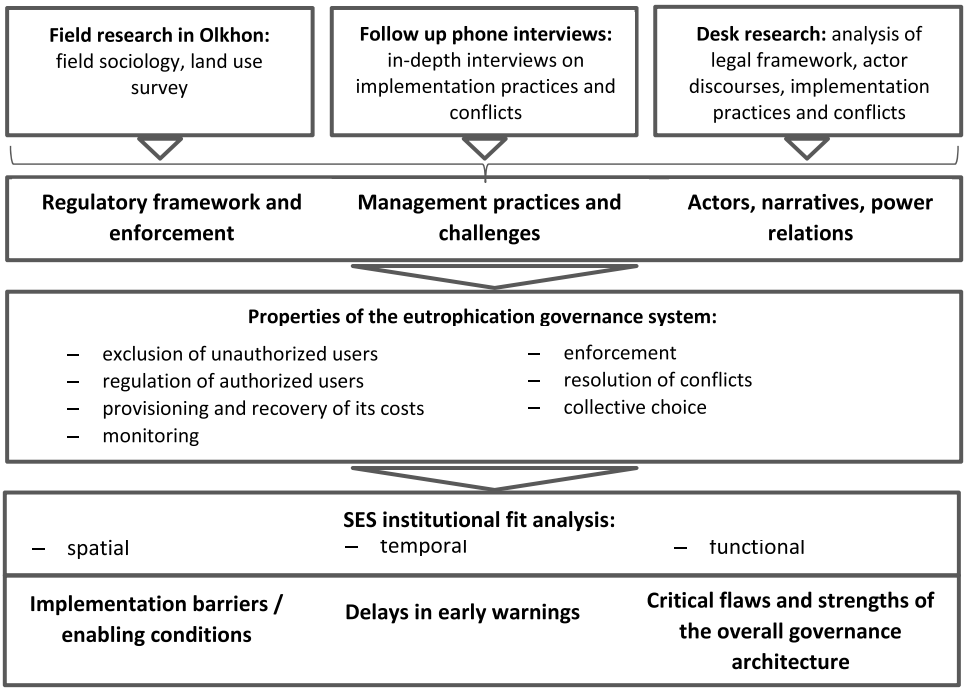


Fig. 1. Methodological framework.

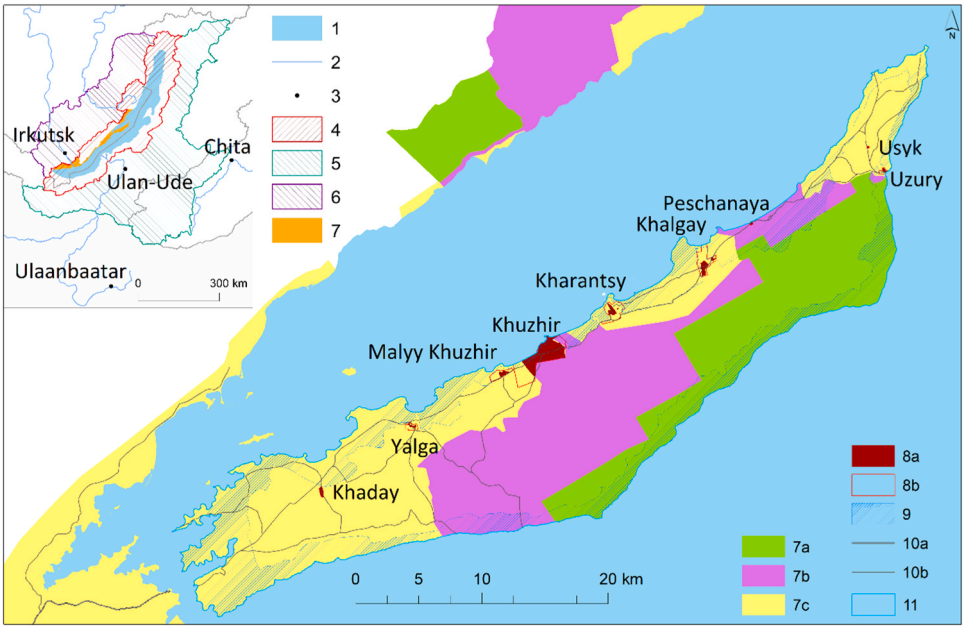


Fig. 2. Case study area and the Baikal Natural Territory (BNT): 1 — Lake Baikal, 2 — major rivers, 3 — major cities, 4 — BNT central zone (BNTCZ), 5 — BNT buffer zone, 6 — BNT atmospheric impact zone, 7 — Pribaikalsky National Park (PBNP), 7a — PBNP Strict Protection Zone (IUCN Ia), 7b — PBNP Recreation Zone (IUCN II), 7c — PBNP Economic Zone (IUCN VI), 8 — boundaries of Khuzhir Municipality settlements before (8a) and after (8b) 2013 Master Plan, 9 — 2018 Baikal Water Protection Zone of Olkhon Island, 10 – paved (10a) and unpaved (10b) major roads, 11 - Case study area (Olkhon Island).

collaboratively minded accommodation owner. The interviewers had a list of questions they needed to address, although the overall conversation was flexible and based on open-ended questions regarding key governance players and the relationships between them, relevant policy and management measures, and visions for the future of Olkhon. HORECA owners were further asked about nutrient fluxes in their households and their incentives to manage them. The interviews were conducted in July 2017 and took from 10–15 min to up to 50 min, and an additional interview was conducted in October 2020. All the interviewees were anonymized, and reported facts were checked whenever possible.

We further proceeded with a desk study to double-check (to check that third parties could support all the facts),'triangulate' field evidence, and take stock of institutional frameworks and relevant developments at both regional and federal levels, in stakeholder conflicts and positions, and in prevailing discourses. We reviewed national and international research literature, traditional and social media, legislation, court decisions, and reports by local municipalities (see the list of references and

Fig. 3. The state of socio-ecological system of Olkhon Island: a — hotel/restaurant/catering (HORECA) developments in Khuzhir Settlement, b — HORECA units in Kharantsy Village, c — main street in Khuzhir Settlement, d — hiking trails on Cape Khoboy.

the online source 2 for regulation and policy documents). Most policy instruments were generally more environmental protection/planning oriented as long as nutrient transport from non-point sources (associated with changes in land use) was of primary interest to this research. The data were recorded, transcribed, and collated to develop a consistent narrative containing all the facts obtained and reflecting on different actor perspectives. It was used to construct storylines explaining management practices and actor interactions as presented in Sections 3.2 and 3.3 and further analysed in terms of the methodological framework (see Fig. 1).

3. Results

3.1. Regulatory framework: development and enforcement

Regarding governance frameworks, lake eutrophication of the lake and land use/environmental management in Olkhon are the focus of several interplaying sectoral institutions established by the federal legislation (see Appendix B for the full list). An overview of the frameworks is presented in Appendix C.

The *Baikal Natural Territory* (BNT) emerged from geographical and environmental literature as an area relevant to the environmental status of the lake. First, BNT did not have any legal recognition (Tulokhonov, 2009); however, it was soon recognised by the Act 'On the Protection of Lake Baikal' (Appendix B: FLSDRF, 1999) that had set the three ecological zones: (1) Central, (2) Buffer, and (3) Atmospheric Impact zones. As with other littoral areas, Olkhon belongs to the BNT Central Zone (BNTCZ). The Act was developed and adopted to enable the environmental management of Lake Baikal, a UNESCO World Natural Heritage Site, which was established in 1996. The delineation of the BNT zones was completed by the researchers of the Russian Academy of Sciences (Antipov et al., 2006) and approved by the Federal Government in 2006 (Appendix B: DGRF, 2006).

To support the implementation of the Act, and in response to the large and growing scale of non-compliance identified by public prosecutors (IRK.ru, 2017a), a dedicated public prosecutor's office for Environmental Protection of Baikal with eight branches was established in December 2017 (TASS, 2017b). Based on the same purpose, in 2016, the Ministry for Natural Resources (MNR) established a dedicated Baikal division of the Federal Supervisory Natural Resources Management Service (Rosprirodnadzor), its monitoring and enforcement arm (Nikitina, 2016). Since 1999, the Act has undergone six revisions that aim to harmonise it with changing legislation. The analysis of media contents suggests the existence of several lobbying groups looking to ease environmental restrictions, which became particularly active in 2015 (Ryabtsev, 2018b). Examples include legislative proposals by the Irkutsk Region to lift the ban on land-use conversion of forests (Kuznetsov, 2009), the government of Buryatia announcing its intentions to reduce BNTCZ (SIA, 2018), and others.

Fishery and water protection zoning was established by federal legislation (Appendix B: FLSDRF, 2004; WCSDRF, 2006). While the fishery protection zoning is a simply delineated 500 m buffer strip, water protection zoning includes two components: (1) littoral protection strips set at 200 m for most of the Baikal shores; the same as for any other inland water bodies with high-value fisheries (Appendix B: WCSDRF, 2006) and (2) a water protection zone. First, this zone was established for Baikal in March 2015 at 57.000 km^2 (Appendix B: DGRF, 2015) but then shrunk to 6.000 km^2 in March 2018, while within settlements, it was narrowed to only 200 m (Appendix B: DGRF, 2018). This development was triggered by complaints from the inhabitants of Olkhon that were voiced during a direct TV broadcast with Russia's President in June 2017. The legislative change, therefore, appeared to be an emotional move by the Russian President.

The previous 2015 Protective Zone edition was extremely conservative. The zones were set at 10–80 km wide and contained 159 settlements with about 128,400 people (Tokareva, 2016). This edition was adopted on a wave of relatively high environmental prioritization that came before and ended shortly after the Winter Olympics in Sochi (2014), and it also could be attributed to the sharply increasing awareness about the degradation of Baikal's ecosystems (see Latynina, 2015). The original protective zone was set as an even larger one than suggested by the researchers of the Russian Academy of Sciences, and its borders fully coincided with the BNTCZ (Latynina, 2016). This zoning was contested by businesses and local communities immediately after its very expedited approval (Latynina, 2016). Representatives of regional authorities were also among the first to complain (Tokareva, 2016), although according to the procedure set by Baikal Act of 1999 (art. 3), zoning should be based on their regional governments' proposals.

Within a year, MNR gave up its ultra-conservative stance, and in meetings and during interviews, its representatives mentioned that cutting the zone to a 500 m strip would be an option (Tokareva, 2016). Yet, this development depended on the momentum from the presidential campaign to become an actual revision in 2018. Although the approved zoning was again claimed as based on the work of the Russian Academy of Science (Government of Russian Federation, 2018), the critics insisted that the Academy's guidelines were used very selectively (Berezina and Shterman, 2018). Again, the process was quick and not particularly transparent. On the suggestion of the Irkutsk Region and Buryatia, settlements were almost completely excluded from the approved water protection zones (SIA, 2018).

The revision of 2018 was contested by environmental activists and academia who appeared particularly worried about the exclusion of settlements; popular support for this revision also did not appear to be overwhelming. Although communities directly benefiting from mass tourism were actively protesting against environmental restrictions at least as insisted by local politicians (Ryabtsev, 2018a), sociological polls run shortly after the zone's revision also showed that it was supported only by 46% of people living in littoral communities, while 48% were against this revision, and 63% recognised that economic developments by the lake required further restrictions (NAFI, 2018). MNR appeared to agree that a new revision would be a good idea; however, this process would also advise environmental NGOs and researchers to exclude themselves from the policy elaboration process (Berezina and Shterman, 2018).

Over 50% of the Baikal coastline is included in nature-protected areas, such as national parks and preserves (also known as *zapovedniks*). The whole island of Olkhon belongs to Pribaikalsky National Park (PBNP). Land use and economic activities within national parks are significantly restricted (see Appendix C). In principle, the land of national parks is under Federal ownership, although privately owned lands can be added to these parks (and further withdrawn), and land privatisation or change of land-use profiles are prohibited. About 20% of the

island is designated as a strict protection zone.

The *UNESCO World Heritage Site* was inscribed in 1996 (under ref. 754). Its area of 88,000 km^2 included 31,500 km^2 of lake surface and 19,000 km^2 of protected areas, whereas major cities and industrial zones located by the lake were not included in the inscription. The UNESCO Site's spatial extent is not clearly defined by any legal action; likewise, the management regimes of this or any other UNESCO Sites in Russia are not legally defined either, except in the Land Code provisions (Appendix B: LCSDRF, 2001, art. 27) that ban any transfers of government and municipally owned lands. Establishing the BNTCZ has ensured the conservation regime of the site, although it is supposed to only roughly coincide with the site (Berezina and Shterman, 2018).

The declared high political priority of environmental protection of Baikal is backed by dedicated 'Federal Target Programs'. The current program, funded at 58 billion roubles (approximately EUR 750 million), is called 'Protection of Lake Baikal and Socio-economic Development of the Baikal Natural Territory'. It ran from 2010 to 2020 but has been extended to 2030 (with a budget increase to 80 billion roubles or approximately EUR 1 billion) as many of its target indicators have not been achieved as of 2018 (TASS, 2017a; Chistyakova, 2019). In December 2020, the program lost the special status of a 'target program', so its measures are presently financed with no priority over any other nature protection measures in Russia (Appendix B: DGRF, 2020a). This program will be replaced with a new and more ambitious program, 'The Great Lake of the Great Country' (some drafts are also known as 'The Unique Baikal'), but the consensus concerning its contents and funding has not been reached, and its approval is still pending (TASS, 2017a). These Federal Target Programs have been criticised for poor planning and management (Chistyakova, 2019) and for overemphasising the development components at the expense of the environmental components (including underfunded research), especially at the implementation stage. During this stage, the high voltage lines connecting Olkhon with the federal grid were funded by a previous version of such an environmental program. This program only resulted in grossly increasing the environmental footprint on ecosystems. One of the reasons for delaying the latest generation program is the recognition of the environmental footprint issue by MNR, which lobbied for more environmentally sound content. Nevertheless, some of the program's drafts promote further radical growth in the number of visitors (TASS, 2016).

In the summer of 2020, after lobbying by industrial and resource-extracting companies following the overall 'turn to the East', the highly controversial Act N№ 254-FZ 'On the Specifics of Individual Regulations in order to Modernise and Expand the Main Infrastructure and on Amendments to Certain Legislative Acts of the Russian Federation' (Appendix B: FLSDRF, 2020) was adopted. This act permits broader economic development, including forest clear-cuts and industrial and urban development, within protected areas around Baikal. In July 2023, another Federal level legal initiative was aggressively pushed through the first hearing as an amendment to the Federal Laws, 'On the Protection of Lake Baikal' and 'On Environmental Expertise' (Appendix B: FLSDRF, 1999; FLSDRU, 1995) that authorizes clear forest cutting in the BNTCZ for an extended list of reasons until 2030 and reclassifies forest lands to other categories until 2025. The document contains an annex with a list of 75 forest stands prioritized for clearcutting (Appendix B: DFLSDRF, 2023). Of note, although the initiative sparked a considerable scandal, including negative reviews by parliamentary committees and allegations of corruption, it received overwhelming support from parliament members (296 versus 76) as described by Voronov (2023).

3.2. Management challenges in the socio-political context

Our case study analysis introduced three groups of key management challenges in terms of nutrient load on the lake:

- (1) management of visitors in terms of the overall number of visitors entering the islands, those entering the national park outside settlements, and their behaviours (such as camping off campsites and in the zone of strict protection and littering);
- (2) control over the sprawling developed areas;
- (3) control of sanitation conditions and sewage discharge, especially for HORECA business, and for the compliance with land-use restrictions, in particular, the use of housing and summer housing (dachas) stock for HORECA.

The *first challenge* and its problematic nature were clearly recognised by the Baikal's Environmental Prosecutor's office, which had already been observed in 2014 (when tourist flow was significant yet modest compared to future years) that the number of visitors is not managed and not even properly counted, while it is clearly beyond the island's coping capacity and according to the consensus of local academic communities, needs to be reduced (Levasheva, 2016). Estimates for 2017 were approximately 700 k visitors that year (Khuzhir Duma, 2018b). The target of limiting the number of visitors appeared in the proposals for the development of Khuzhir in 2018 (Khuzhir Duma, 2018b), although this limitation conflicts with key federal strategic documents calling for more tourists in the Baikal area (TASS, 2016).

Although visitor management comes as its direct obligation, PBNB is not entitled to restrict access to settlements excluded from its area (such as Khuzhir and other big villages), while Khuzhir and the ferry point are connected by a federal road that must be restriction-free as per the federal regulation (Appendix B: Statute, 2009). That said, PBNP is concerned only with the visitors entering one of the several official trails (Mamontova, 2014). PBNP is severely understaffed. Gate-keeping and toll-taking tasks are therefore prioritised over proper surveillance and patrolling (Ryabtsev, 2015a). Even though gate-keeping appears to be either neglected/left unattended or corrupted or the number of vehicles cruising the protected area is clearly above prescribed thresholds; even in 2014, Rosprirodnadzor inspectors counted 27 cars concurrently parked at Cape Khoboy, with an allowed daily limit of only ten cars per day (Mamontova, 2014). As a result, soil and vegetation cover has been destroyed around all the spots that are popular with tourists (Znamenskaya et al., 2018; field observations of July 2017). Many tourists have been observed to camp at areas other than allowed campsites (such as an estimated 1500 tourists were observed camping on August 4–8, 2014), and this figure even includes constructions of temporary cabins surviving for several years (Ryabtsev, 2014b). Nutrient load generated by legal and illegal visitors appears to be significant as most visitors to Khuzhir also go on a tour around the island, while even the most visited spots along official trails are not equipped with toilets. Locals are seriously annoyed by illegal campers as these campers spoil landscapes without bringing them any profit. PBNP cannot manage this problem due to insufficient human resources, which has caused concern among the local citizens (Interviews 39–60).

The *second challenge* is related to the sprawl and legality of HORECA units and is caused by controversies with land ownership and entitlements and with the high level of readiness of dwellers (both local ones and holidaymakers). HORECA owners take risks and explore them; new summer houses and HORECA facilities are emerging and spreading all over the island, while sanitation is poor, and wastewater mostly ends up in the groundwater table (see below more on the third challenge). The land market in Olkhon appears to be highly criminalised, at least during the first years of the tourism rush. The mayor of Khuzhir was allegedly involved in many suspicious land deals during his tenure (2005–2011) and was found hanged in 2011 (FederalPress, 2011).

In addition to commonly occurring instances of explicitly unauthorised construction within the park (such as Ryabtsev, 2014a), several land transfers from PBNP to the settlements of Khuzhir Municipality took place during the development of the 2013 Master Plan of Khuzhir. The reason for such transfers was to clarify boundaries, and they mostly involved chunks of land classified by the State Cadastre as agricultural (Ryabtsev, 2015b); in addition to Khuzhir, this transfer also included eight other villages, four of which have fewer than ten inhabitants

(Khuzhir Duma, 2018b). As a result, settlement areas were significantly expanded by up to 10-times for some villages, so that a total of 1947.82 km^2 or 12.3% of Olkhon was recognised as "lands of human settlements" (Khuzhir Duma, 2018b). NGO observers found those transfers highly controversial and raised questions about corruption (Ryabtsev, 2015b). Such expansions led to a "revival" of small and abandoned settlements in which new houses and conglomerates of recreational facilities started to rapidly appear as did a strict protection zone (ibid.).

Substantial land-grabbing opportunities emerged due to the options to purchase the land shares owned by local people after the collective farms (also known as 'Kolkhoz') were dissolved in the 1990 s. During the initial period of the land rush, the perceived value of such shares was close to nothing as the land was abandoned and unproductive (interview 34). At that time, the municipality also sold modestly priced land parcels, and NGO observers suspected corruption. However, a land-management officer at Khuzhir Municipality explained that 'reserve lands' (ones previously undeveloped as they were believed to belong to PBNP) were distributed to needy citizens to help with their housing problems (7ka, 2018).

Regarding land ownership and entitlements, the revisions did not help reduce the legal uncertainty. In 2017, the District Public Prosecutor's office went to the District Court to contest the right of Khuzhir Municipality to distribute the lands formerly managed by PBNP on the ground that although the municipality had agreed to new borders and a national park, the documents were not countersigned by a responsible federal body, such as MNR. They also argued that any construction activities within the national park are forbidden if they do not serve conservation purposes, and therefore any housing projects would be illegal. After a lengthy process that lasted over a year and involved 23 postponed hearings, the District Court agreed with prosecutors (Olhonsky Sud, 2018). Although the defendants for this trial were two house owners in a contested forest (alongside the Khuzhir Settlement), its consequences were far-reaching as the Court's resolution effectively terminated most of the land transactions that took place in Olkhon from 2010 to 2013.

The *third challenge* concerns sanitation arrangements as most housing and HORECA units discharge their sewage to aquifers, watercourses, and/or directly into the lake. While detached housing units in the countryside are not legally forbidden to discharge in such a manner, HORECA facilities are subject to environmental permits. Within settlements, the construction of guest houses and hotels is legal if they comply with permitting and sanitary requirements. In cases of areas not belonging to settlements, agricultural lands outside PBNP were often converted to 'dacha communities' and advertised as short-term rental houses. Within PBNP, such questionable sanitation (see Shkaruba et al., 2021) conversions are forbidden; therefore, new constructions are being self-branded as 'farmer houses' (for this purpose is the only eligible one), while their actual purpose is often HORECA-related (BIEPO, 2018). Local authorities recognize this branding as a major problem because under the current legislation, many de-facto HORECA facilities cannot be legalized (Khuzhir Duma, 2018b).

Regarding nutrient load on the lake, the problem is that even legally established HORECA units often ignore sanitary requirements (BIEPO, 2018), while those operating illegally appear to care even less. This ignorance was observed both by our field survey and by public prosecutors, who found that almost every hotel they inspected had major compliance issues while the total number of HORECA facilities is simply not known (IRK.ru, 2017b). In its strategic documents, the Municipality of Khuzhir does recognise the problem of high nutrient loads (Khuzhir Duma, 2014). However, only in the development agenda for 2019–2023 (adopted in 2018) was wastewater treatment considered for future development plans (Khuzhir Duma, 2018a).

Public prosecutors work to bring both legal HORECA facilities without proper wastewater management and the illegal ones that are declared as farms and detached housing to court. As the capacity of district prosecutors is modest, more new units appear every year than can be shut down by the court (Khuzhir Duma, 2018a). The prosecutors typically target larger facilities (see Mamontova, 2018) unless media pressure generated by environmental activists exists (see Ryabtsev, 2017b). Monitoring and enforcement are also constrained by the limited police force (only two staff) stationed on the island because federal norms set the number of law enforcement per capita, and although Olkhon receives over 700k tourists per annum, its registered permanent population is only 1.7 thousand people (January 2018). Khuzhir Municipality also adopted this line of reasoning to explain their unawareness of land use and environmental misconduct (interviews 1, 5, 36).

In terms of the development of institutional arrangements around the management of eutrophication in Olkhon, a major game-changer is being discussed by the Federal Government as a proposal to grant complete exclusions of the areas recognised as 'land of settlements' from PBNP and to compensate for this loss with forested lands elsewhere by Lake Baikal (Appendix B: DDGRF, 2019) has been put forth. Settlements have already been excluded from the water protection zone of Baikal (see 3.2), and with the new development, the only protective regime left would be the BNTCZ, which was effectively terminated in December 2020.

3.3. Actors, their narratives, and advocacy coalitions

In their public statements, any actors and stakeholder groups involved in eutrophication governance in Olkhon have declared their commitment to sound environmental management of Baikal, but this declaration is often the only common aspect they share. For the rest of the governance, the actors and their networks are in a state of conflict.

On one side of the conflict are conservation NGOs (such as Baikal Environmental Wave, Lake Baikal Foundation, My Baikal, Biodiversity Conservation Center, Socio-Ecological Union, Greenpeace, WWF) and local standalone activists, who have observed the deterioration of ecosystems and are determined to halt it at any cost. This group takes issue with (a) HORECA owners and new housing units because they produce a negative environmental impact and exploit any hole in the poorly enforced conservation regimes; (b) the municipality because it embraces legal uncertainties and has a suspiciously good understanding with the previous group; (c) the PBNP because of its moderate success with achieving conservation objectives, for favouring tourism at the expense of conservation, and for the controversial deals with tourism business and the municipality; and (d) public prosecutors (including environmental ones) for their slow action. Members of this group are well integrated into and supported by broader NGO and academic communities in Russia, and they actively publish in regional and federal outlets. The spirit NGO and standalone activists express through the media is that they are being defeated at all levels and that their wins are rare and occasional, while the opponents are powerful and connected with regional and federal elites, who only seek how to gain electoral sympathies or to make Baikal generate more profits (Ryabtsev, 2017d, 2018d). Importantly, most of the NGOs listed above have been recently recognized by the Russian government as foreign agents (and subsequently closed) or 'undesirable organizations' (this list includes WWF and Greenpeace), and any ties with them have been criminalized. These actions by the government have significantly weakened the Federal and international level backup of local conservation activists since the start of the war.

Although not entirely happy about them, conservationists are in situational coalitions with public prosecutors as those prosecutors are mandated to ensure law enforcement. Although the capacity of prosecutor offices is inadequate and legal uncertainties around land-use ownership and entitlements are overwhelming, they strictly stick to their institutional mandate. Conservationists help them with monitoring and putting media pressure if their complaints are not well-considered or processed slowly (see Ryabtsev, 2017b). While we could not spot a single public statement by public prosecutors describing their

relationship with conservationists, there are notes of discontent towards the municipality for their opportunistic ways (IRK.ru, 2017b) and towards the regional (Irkutsk) government for their delay with legally binding definitions of HORECA and tourism activities as this tardiness constrains litigation options (GazetaIrkutsk, 2018). Activists never mentioned Rosprirodnadzor as an ally. However, Rosprirodnadzor does cooperate with prosecutors on compliance monitoring with environmental standards (BIEPO, 2018). PBNP is supposed to be in the same camp as Rosprirodnadzor; however, its overall attitude towards NGOs and activists, as well as towards business communities and the municipality, varies significantly depending on the personality of a current park director ([interviews 1, 4, 5]).

At the other end are HORECA and housing developing businesses appear to have teamed up with Khuzhir Municipality. Their narrative is that land-use relations on the island have been under great uncertainty due to more than a decade-long unwillingness of PBNP and MNR to resolve such relations, while the Federal Government has been highly inconsistent in defining the status of the land. Land circulation has been restricted since 2001. However, land transactions were not questioned by public prosecutors until 2016; during this time, many land parcels changed owners while sizeable investments were made in recreation and housing, and it is unfair to reset the whole set of rules, even though the rules are informal, for *bona fide* owners all at once and backdate the rules (Kryshkina, 2017, 2018). The activities of environmental public prosecutors have been called an act of terror on lawful citizens and businessmen as they destroy the well-being of local communities (Kryshkina, 2017; Bakulev, 2018). Wastewater treatment for Olkhon is recognised as essential, but the treatment needs to be arranged and financed by the Federal Government (Kryshkina, 2017, 2018).

This narrative can be rather selective in presenting facts (Tayga, 2018), and it is very effectively communicated to regional and federal audiences through the media (Sibir Realii, 2018), accompanied by threats of protest, mass resignations of village mayors around Baikal (Presidential Council, 2018), collective open letters, and direct appeals to government officials of various ranks (see Kryshkina, 2017, 2018; Bakulev, 2018). It appears the direct appeals are working very well, at least since an inhabitant of Olkhon famously complained to Vladimir Putin about excessive environmental restrictions (see 3.1). Typically, the complaints are lodged on behalf of local citizens, in particular, the vulnerable groups; as an example, public prosecutors were publicly accused of taking houses from needy families (Tayga, 2018). Popular opinions might, however, deviate from the narrative promoted by the municipality and businesses. For instance, many were against construction activities in the sacred 'Shaman Woods' in which the municipality sold land parcels for housing developments (7ka, 2018). During the massive protests organised by Khuzhir Municipality in December 2018 against environmental restrictions, some representatives of the citizens spoke against HORECA developments and requested lifting land circulation bans only for housing and social infrastructure, while the local shaman said in his speech that federal regulation is restrictive only towards violators of environmental permit requirements. However, the meeting resolution was circulated to the media and then sent to the federal government with demands that any land circulation restrictions be lifted (Ryabtsev, 2018c).

In December 2018, the Head of Olkhon District voiced this narrative at a meeting with the Presidential Council for Civil Society and Human Rights and the vice-chair of the council followed up by a statement:

> '…the Council is worried and concerned… and in the near future it will address the President's representative in the Siberian Federal District and the General Public Prosecutor with a request to inspect the legality of prosecutors' prescriptions, court decisions, and other information about large-scale violations of human rights' (Presidential Council, 2018).

Such an aggressive line of lobbying (involving direct attacks against federal agencies) is highly unusual for Russia and alongside the quick and efficient communication, suggests that significant business interests might be attached to such lobbying efforts. In terms of ownership, business communities concerned over Olkhon are difficult to describe as most of the business operations are not legally established. NGO observers (Ryabtsev, 2017a) and interviewees (interviews 1, 5, 35) insist that people from Irkutsk and major Russian cities own all of the larger facilities.

Relatively new business development is visible, and the growing presence of Chinese tourism is estimated to reach one million visitors for Baikal destinations (Irkutskaya Oblast, 2016), and it is typical for Chinese tourists to travel in organised groups served by Chinese companies (often illegal ones) throughout Russia (Infpol, 2017). These travel patterns appear to annoy all of the stakeholder groups who mention that Chinese businessmen use 'environmental lobbies' to eliminate HORECAs run by small businesses (Kryshkina, 2017), free-ride, and super-optimise taxes (Infpol, 2017), and that both visitors and business produce a high level of pollution (Ryabtev, 2017c) as described by interviews 39–60. NGO observers detect tensions and predict conflicts (Ryabtev, 2017c).

The core beliefs and values of local communities appear to be spread across broad trade-offs between demands for socio-economic well-being and healthy ecosystems, which have been recognised as a basis for tourist attractiveness. On the one hand, all interviewees reported that they dislike development activities in sacred woods and biodiversity hotspots (interviews 2, 3, 33–36, 39–60), while on the other hand, development restrictions were also opposed in any form (interviews 1, 6–30, 3–60), especially from the point of view that businessmen coming from outside of the community appear to have less trouble accessing the land in Khuzhir (Ryabtsev, 2019). Furthermore, local citizens have better trust in the local council and tend to blame PBNP and federal environmental protection authorities for unfair land allocation rather than blaming the local council in charge (Ryabtsev, 2019).

4. Discussion and conclusions

In the studied case of the littoral SES and its broader governance context, it was demonstrated that on the one hand, governance solutions developed by the Federal Government aimed at curbing Baikal's eutrophication do not constitute a comprehensive and coherent set of measures that would target a variety of stakeholder groups with an applicable repertoire of policy instruments. On the other hand, many local actors oppose the conservation agenda, and in doing so, they actively emphasize any gaps and inconsistencies in the eutrophication governance regime. This process results in a high level of conflict involving all the key actors and spreading across all policy levels. Furthermore, we discuss constraints for successful eutrophication governance, first from the perspectives of the littoral SES and generic functions of its institutions, and then in terms of misfits pertaining to the whole eutrophication governance system. To ensure a broader perspective on institutional misfits, we introduced a comparative international perspective to their analysis.

4.1. Functions of the environmental system through the lenses of governance framework and regime

Our analysis of generic governance functions (Paavola, 2008) in littoral SES of Olkhon is summarised in Table 1. For the purposes of our analysis, we primarily considered how institutions and actors interact over the issues and drivers pertaining to nutrient discharge into the environment.

4.2. Misfits in the architecture of eutrophication governance

The overview of governance functions confirms the well-established observations concerning poor quality governance by the state in Russia in general (Gel'man, 2021) and also demonstrates the complex nature of governance barriers causing implementation deficits of federal policies

Table 1
Generic environmental governance functions.

Generic functions	Governance framework	Governance regime
1) exclusion of unauthorised users	Regulatory frameworks do not regulate nutrient discharge by households yet clearly forbid it for HORECAs. Land-use regulation provokes conflicts and is not stable with various new modification proposals always in the pipeline. Distinctions between HORECA and residential or agricultural uses are not clearly defined either. At the same time, dedicated Baikal-related regulation sets a broad and rigid framework of exclusion rules	Local actors do not have clear incentives to curb nutrient load while monitoring and enforcement measures do not create sufficient pressure on the collective action. Illegal HORECA developments and land transfers are disputed by federal prosecutors, yet the cases are too few. The local adoption of the federal exclusion framework makes it fragmented and optional as some exclusion rules are not realistic, so the rest of the framework is taken less seriously
2) regulation of authorised resource uses and distribution of their benefits	Entitlements rules do not provide clear legal ways for HORECA development, although they allow (to a limited extent) to use residential houses (including farms and summer cottages) for hospitality services, with no clear rules though. Local residents are further entitled to green fields within the formal boundaries of settlements.	The collective action is that the entitlements are fully used and overused, and their limits are contested, with local authorities rather supporting the collective action, while NGOs and federal prosecutors contest them, and PBNP has no clear standing. The incomes and fiscal benefits are shared mostly between local and regional actors while environmental impacts are being accumulated with far-reaching consequences relevant nationwide. Non-local HORECA owners are seen as not entitled to pollute.
3) provisioning and the recovery of its costs	No support schemes to support responsible nutrient management, recovery of environmental investment or the recognition of responsible users (while wastewater treatment infrastructure does not exist) are available.	Although the pressure on illegal HORECA by federal prosecutors is gradually increasing, such pressure is still not sufficient to create incentives for responsible users. Some limited green self-branding is in place, but it is not duly substantiated.
4) monitoring	Land allocation and compliance with land-use rules are set to be monitored by authorised bodies managing the land, such as municipalities and PBNP, and ultimately by Rosprirodnadzor. Nutrient discharge from private residents is not monitored, and while formally recognised, HORECA is required to prevent any discharge to the ground- or surface waters with no formal monitoring obligations clearly assigned	Land allocation, ownership status, and management are not closely watched by the municipality and PBNP, or their monitoring procedures do not function. Support from police is limited, as only two staff are stationed in Olkhon. NGOs, journalists, and local activists are more active with watchdog functions (such as finding illegal HORECAs or questionable land transactions) and providing input to prosecutors' work in addition to creating pressure through media publications.
5) enforcement	Rules of land allocation, management of housing stock, building and environmental permitting are enforced by entitled land management bodies (municipality and PBNP), regional branches of dedicated federal agencies and regional agencies, and regular enforcement bodies (police, public prosecutors)	Public bodies experience a severe shortage of enforcement capacity, as PBNP offers pay much beyond the local average, while police and environmental prosecutors have too few staff positions. Due to the unrealistic nature of many restrictions and some legal uncertainties, the actual and potential violations are massive that further overloads enforcement bodies. The municipality often sides with local people and sometimes overlooks that the law is being compromised.
6) conflict resolution	Normally conflicting sides are expected to enter the litigation process	The municipality must be running a range of conflict resolution mechanisms as there are no openly reported natural resource or land conflicts within Olkhon; the mechanisms may not be entirely legal, though. The conflicts identified by external monitors are being brought to the court, where the process is slow and expensive. A direct informal appeal to high-level authorities (including the president) is in broad use, although to a variable effect.
7) collective choice	Formal governance rules (including sectoral policies) still do not provide positive motivation for the development of collective choices supporting involvement in natural resource management or environmentally friendly behaviour. Negative incentives (restrictions and exclusion rules) are plentiful.	The legitimacy of land use allocation and environmental protection frameworks is compromised due to perceived unrealistic nature of some restrictions, and overall sceptical attitude regarding the rationale of the others. Respect for nature conservation rules is further undermined by expectations of quick profits, traditionally weak monitoring, as well as a strong belief in the unlimited carrying capacity of ecosystems.

for halting the eutrophication of Baikal. After further examining the governance architecture, we can attribute the barriers to *institutional misfits* (Folke et al., 1998) of which many have already been observed in nature-protected areas elsewhere in the former USSR region (Shkaruba and Kireyeu, 2013).

Out of four types of *spatial misfits* identified by Shkaruba and Kireyeu (2013) for ecosystem governance in Belarus, we could directly find two in Olkhon. One was related to unclear or legally unsettled boundaries between areas with different management mandates that led to numerous land-use disputes, and the other was related to the instability of such boundaries for which land-users with a high lobbying capacity seek to expand and legalise new *status quo* situations.

Out of three groups of *functional misfits* observed by Shkaruba and Kireyeu (2013), we could locate only one, which was between a core function of the managing agency (PBNP in our case) and an emerging challenge the agency is not capable of managing (large numbers of tourists and related growth of provided services). Related instances of such misfits also include an insufficient number of police officers in Khuzhir due to staffing rules (not accounting for massive seasonal population inflow) or limited staff of the Public Prosecutor Office for Environmental Protection of Baikal that was not originally designed to look after the countless lower scale violations but rather a limited number of larger-scale violations. The most important functional misfits observed in Olkhon apparently do not have counterparts in Belarus as they come from the mismatches in policy rationales expressed by local communities and those underlying federal policies. Municipalities tend to adopt the priorities of local people and, therefore, contribute further to horizontal policy disintegration, similar to what was observed in situations with the implementation of EU directives in newly accessed member states (Leventon, 2014; Niedziałkowski et al., 2014). In the case of the eutrophication governance of Baikal (as demonstrated by the Olkhon SES), the conditions favouring this type of mismatches appear to be deeply embedded in the very structure of the environmental system (e.g., see the generic properties). Furthermore, unlike the EU's cases, Baikal's cases are aggravated by highly contradictory signals sent from Russia's top policymakers.

Regarding *temporal misfits*, our findings are consistent with the observations from Belarus, in which the national environmental protection system reacts quickly enough to abrupt changes while incremental changes are recognised and addressed more slowly. Baikal is in the spotlight of the federal news agenda and attracts attention and much federal funding to address the major impact originating from a single

source. As international experience demonstrates, eutrophication abatement requires systematic grassroots work, while potential solutions are not universally accepted, and success is difficult to achieve (Gren, 2008; Jetoo, 2018; Ibisch et al., 2016.). This lack of success and arguably also a lower sense of urgency have led to a delay in a large-scale and coordinated response by the federal government.

4.3. Conclusions: wrapping up on barriers and moving on with solutions

Our findings reveal diverse barriers to nutrient load reduction policies, which are concentrated at the level of local communities. Importantly, any local actors, including local residents and HORECA businesses, have demonstrated that, in principle, they accept the global importance of water quality protection objectives, also in terms of sustainability of their business opportunities, requiring the high ecological status of lake and island ecosystems. Furthermore, many (including those running and employed in water polluting activities) have expressed strong relational values towards land- and waterscapes, such as those triggered by the traditional beliefs of the indigenous Buryat population. Specific restrictive measures are disputed, however. Some of these measures directly hurt their common sense perception of what is reasonable; hence, such measures are immediately rejected. Furthermore, for many years most of the restrictions were not enforced, and many actors, including local authorities, have ignored them. 'Business as usual' practices were perceived as fully legitimate, and that is why it felt outrageous when conservation groups started to push for the enforcement of the regulations. Furthermore, businesses appear to discredit all the conservation intentions. In this situation, any actors, such as NGOs, academics, and/or PBNP, which are promoting a conservation agenda, are particularly weak as they face outright hostility and no interest in searching for compromises from the side of their opponents. In their turn, conservation-minded actors either give up elaboration attempts and propel the level of conflict or compromise to the extent to which the conservation agenda is almost lost, similar to many other ecosystem governance conflicts in Eastern Europe in which the stakes are high (see Niedziałkowski et al., 2014).

One answer to this situation involves revisiting policy tools and management options to remove ambiguities and contradictions and to set clear objectives with trackable implementation perspectives. On the one hand, this process might require some policy innovation, such as inclusive and iterative stakeholder consultation and moderation exercises, and, as the most challenging part, embedding the outcomes of these exercises in actual policies. On the other hand, this process would involve massive and scrupulous inventory efforts and deliberations regarding any poorly defined land-use boundaries and contested situations; the number of disputed properties and land-use options can be significant at the scale of the whole lake, and while a blanket "land-use amnesty" might have grave environmental consequences, the strictest measures for upholding and enforcing the law may not be feasible. At any rate, the land-use regime within PBNP and BNTCZ should be somewhat loosened to enable sustainable investments. However, monitoring and enforcement would require a substantial effort because demonstrable rent-seeking intentions by market actors are enormous, while *bona fide* practices have a disappointing track record. This issue further necessitates the urgent need for low-cost and acceptable conflict resolution mechanisms.

Another traditional policy response is capacity building. One of its directions could be towards the filling up of obvious capacity gaps of public bodies responsible for enforcement and monitoring, including municipalities, local police, environmental prosecutors, and PBNP staff, who are greatly underpowered at present. To ensure adequate monitoring, some further capacity support would also be needed for civil society groups, for instance, in terms of equipment, human resources, organisation, and information. Another direction would be providing knowledge (e.g., through consultations of green HORECA) and resources for making this knowledge useful and operational (e.g., through direct subsidies, fiscal mechanisms, and support for green labelling).

The suggested policy directions represent a substantial challenge to Russia's current policy system, yet its rich human and social capital and economic powers give it sufficient capacity to move forward. The greatest challenge, however, is the globally unstable nature of the decision-making system at the highest political level and the selective enforcement of rigid regulatory standards. The storyline of Baikal environmental policies demonstrates their susceptibility to powerful anti-environmental lobbies and populist traps on both sides of the barricade. The resulting fluctuations work to undermine the legitimacy and the rational of conservation actors. At the same time, such fluctuations encourage local economic actors to venture further into grey areas, which again raises the level of conflict and reinforces path dependence patterns.

CRediT authorship contribution statement

Ruben Mnatsakanian: Writing – original draft, Resources, Investigation, Formal analysis, Data curation. **Irina Molodikova:** Writing – original draft, Methodology, Investigation, Formal analysis, Data curation. **Anton Shkaruba:** Writing – original draft, Visualization, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Viktar Kireyeu:** Writing – review & editing, Visualization, Software, Investigation, Formal analysis, Data curation, Conceptualization. **Kalev Sepp:** Writing – review & editing, Supervision, Resources, Funding acquisition.

Declaration of Competing Interest

The authors declare no conflict of interest.

Data availability

Data will be made available on request.

Acknowledgements

This research was supported by the European Union's Erasmus+ Programme through SMART project (565367-EPP-1–2015-1-RU-EPPJMO-MODULE). We warmly thank 2017 SMART Summer School participants for their help with data collection.

Appendix A

List of interviews

	Organisation /stakeholder group	Division or a specific organization	Interviewee description	Date	Interview ids
1	Khuzhir municipality	Khuzhir Municipality Administration	Head of the Administration	July 17, 2017	1
		Cultural Center of Khuzhir Municipality	Director	July 17, 2017	2
		Khuzhir Local History Museum	Director	July 15, 2017	3
2	Protected area	Pribaikalsky National Park Administration	Former member of the administration	October 14, 2020	4
		Pribaikalsky National Park, Island Forestry	Assistant head of the forestry	July 17, 2017	5
3	Service providers	Hotel and HORECA	Owners	July 15–17, 2017	6–10
			Staff members	July 15–17, 2017	11–30
		Local polyclinic	Staff representative	July 16, 2017	31
		Waste management company "Daban"	Director	July 16, 2017	32
		Mobile sauna	Owner	July 15, 2017	33
			Owner	July 16, 2017	34
		Tourist bus	Driver	July 16, 2017	35
			Guide	July 16, 2017	36
4	Research and Educational Organisations	Irkutsk National Research Technical University	Researcher	July 16, 2017	37
		Institute of Geography, Siberian Branch of the Russian Academy of Science	Researcher	July 16, 2017	38
5	Local residents	Khuzhir Settlement	20–40-year-old residents	July 15–17, 2017	39–48
			Residents aged 50 and older	July 15–17, 2017	49–60

Appendix B

List of legislation and normative acts

DDGRF, 2019. Government of Russian Federation. Draft of the Decree "*On expanding the territory of the Pribaikalsky National Park*", created on June 17, 2019. URL: https://regulation.gov.ru/projects#npa=92260 (Accessed 3 May 2021)

DFLSDRF, 2023. State Duma of the Russian Federation. Draft of the Federal Law "*On amendments to Article 25–1 of the Federal Law On the Protection of Lake Baikal and Article 11 of the Federal Law On Environmental Expertise*", registered on June 23, 2023. URL: https://sozd.duma.gov.ru/bill/387575–8 (Accessed 24 November 2023)

DGRF, 2001. Government of the Russian Federation. *Decree "On approval of the list of activities prohibited in the central ecological zone of the Baikal natural territory"*, approved on Aug 30, 2001 №643 (with amendments and additions). Collection of Legislative Acts of the Russian Federation, Sep 10, 2001, 37, 3687. http://www.consultant.ru/document/cons_doc_LAW_33195/. Document expired.

DGRF, 2006. Government of the Russian Federation. *Decree "On the approval of the boundaries of the Baikal natural territory and its ecological zones"*, approved on Nov 27, 2006 №1641-r. Collection of Legislative Acts of the Russian Federation, Dec 4, 2006, 49(part II), 5256. http://www.consultant.ru/document/cons_doc_LAW_64590/

DGRF, 2015. Government of the Russian Federation. *Decree "On establishing the boundaries of the water protection zone and the fish protection zone of Lake Baikal",* approved on March 5, 2015 №368-r. Collection of Legislative Acts of the Russian Federation, March 16, 2015, 11, 1644. http://www.consultant.ru/document/cons_doc_LAW_176158/

DGRF, 2018. Government of the Russian Federation. *Decree "On Amending the Order of the Government of the Russian Federation of March 5, 2015 №368-r",* approved on 26 March 2018 №507-r. Collection of Legislative Acts of the Russian Federation, Apr 02, 2018, 14, 2015. http://www.consultant.ru/document/cons_doc_LAW_294677/

DGRF, 2020a. Government of the Russian Federation. *Decree "On Amendments to the State Program of the Russian Federation "Environmental Protection",* approved on Nov 12, 2020 №1819. Collection of Legislative Acts of the Russian Federation, Nov 23, 2020, 47, 7523. http://www.consultant.ru/document/cons_doc_LAW_367765/

DGRF, 2020b. Government of the Russian Federation. *Decree "On invalidating certain acts and certain provisions of certain acts of the Government of the Russian Federation, on the abolition of certain regulatory legal acts of federal executive bodies containing mandatory requirements, the observance of which evaluated when carrying out control measures in the implementation of state environmental supervision",* approved on Sep 18, 2020 №1496 (as revised on Dec 30, 2020). Collection of Legislative Acts of the Russian Federation, Sep 28, 2020, 39, 6073. http://www.consultant.ru/document/cons_doc_LAW_363081/

DGRF, 2020c. Government of the Russian Federation. Decree *"On approval of the list of activities prohibited in the central ecological zone of the Baikal natural territory"*, approved on Dec 31, 2020 №2399. Collection of Legislative Acts of the Russian Federation, Jan 11, 2021, 2 (part II), 448. http://www.consultant.ru/document/cons_doc_LAW_373453/

FLSDRU, 1995. State Duma of the Russian Federation. *Federal Law "On specially protected natural areas*" approved on March 14, 1995 №33-FZ (as amended on Dec 30, 2020). Collection of Legislative Acts of the Russian Federation, March 03, 1995, 12, 1024. http://www.consultant.ru/document/cons_doc_LAW_6072/

FLSDRF, 1999. State Duma of the Russian Federation. *Federal Law "On the protection of Lake Baikal"*, approved on May 1, 1999 №94-FZ (as amended on Dec 12, 2020). Collection of Legislative Acts of the Russian Federation, May 03, 1999, 18, 2220. http://www.consultant.ru/document/cons_doc_LAW_22964/

FLSDRF, 2004. State Duma of the Russian Federation. *Federal Law "On Fishing and Conservation of Aquatic Biological Resources"*, approved on Dec 20, 2004 №166-FZ (as amended on Dec 08, 2020). Collection of Legislative Acts of the Russian Federation, Dec 27, 2004, 52(part I), 5270. http://www.consultant.ru/document/cons_doc_LAW_50799/

FLSDRF, 2020. State Duma of the Russian Federation. *Federal Law "On the specifics of regulation of certain relations in order to modernize and expand*

the backbone infrastructure and on amendments to certain legislative acts of the Russian Federation", approved on July 31, 2020 №254-FZ. Collection of Legislative Acts of the Russian Federation, Aug 31, 2020, 31(part 1), 5013. http://www.consultant.ru/document/cons_doc_LAW_358735/

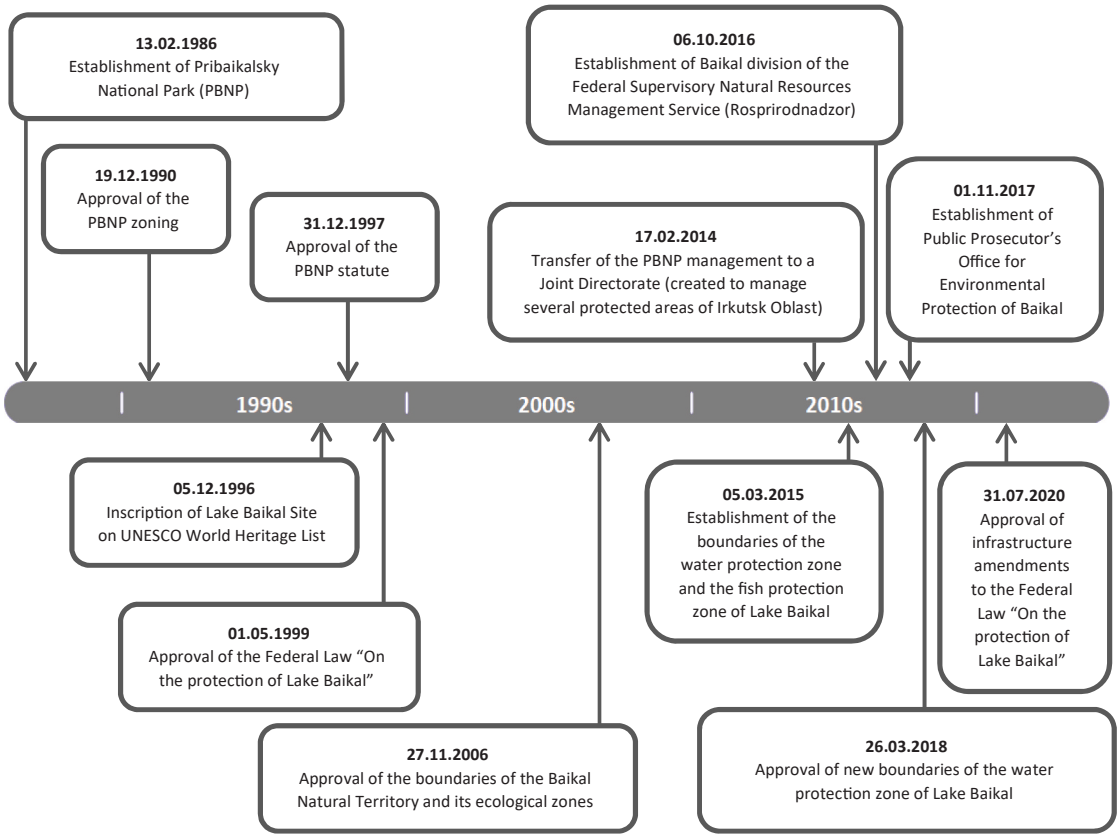
FLSDRU, 1995. State Duma of the Russian Federation. Federal Law "*On Environmental Expertise*" approved on November 23, 1995 №174-FZ. Collection of Legislative Acts of the Russian Federation, 1995, 48, 4556. https://www.consultant.ru/document/cons_doc_LAW_8515

LCSDRF, 2001. State Duma of the Russian Federation. *Land Code of Russian Federation*, approved on Oct 25, 2001 №136-FZ (as amended on Apr 20, 2021). Collection of Legislative Acts of the Russian Federation, October 29, 2001, 44, 4147. http://www.consultant.ru/document/cons_doc_LAW_33773/

Statute, 2009. Statute "On the Federal State Institution "Pribaikalsky National Park" (with amendments). URL: https://baikal-1.ru/wp-content/uploads/2017/06/doc-Pribaikalsky-regulations.pdf (Accessed 3 May 2021)

WCSDRF, 2006. State Duma of the Russian Federation. *Water Code of Russian Federation,* approved on June 3, 2006 №74-FZ (as amended on Dec 08, 2020). Collection of Legislative Acts of the Russian Federation, June 5, 2006, 23, 2381. http://www.consultant.ru/document/cons_doc_LAW_60683/

Timeline of key legislative and normative developments for the case study area



Appendix C

Sectoral environmental governance frameworks relevant for Baikal littoral communities

Sectoral frameworks	Establishing legislation	Spatial extent	Land-use / economic restrictions
BNT's Central Zone (BNTCZ); corresponds to UNESCO world heritage site	Appendix B: FLSDRF, 1999	The whole island, the lake, and all other coastal areas (total approximately 90,000 km^2)	Bans and/or limitations within the whole BNT on: • discharge and emission of harmful substances and waste disposal; • physical changes in the state of the lake or its components (water temperatures, water levels, and in/outflow fluctuations beyond the established range); • biological pollution of the lake associated with alien/invasive species in Baikal and connected water bodies. Bans within the whole BNT on: • construction works, reconstruction works subject to the state environmental review

(*continued on next page*)

(*continued*)

Sectoral frameworks	Establishing legislation	Spatial extent	Land-use / economic restrictions
Fisheries protection zone	Appendix B: DGRF, 2001 (canceled by DGRF, 2020b); DGRF, 2020c	500 m inland along the coastline	Activities prohibited in the central ecological zone: • industrial-scale timber harvesting • any polluting industries and mining, disposal of hazardous wastes, wastewater discharge not complying with environmental standards • recreational activities and housing without water treatment arrangements, camping outside dedicated areas • timber harvesting (except for the needs of local communities) • sizeable construction activities subject to the environmental appraisal The same as for the BNT's Central Zone and further bans on: • transfer of forested lands to any other land-use categories except nature conservation areas • croplands and pastures • new cemeteries and waste disposal sites • movement and parking of motorised vehicles on unpaved surfaces • wastewater discharge • deployment of aviation for pesticide application
Water protection zone	Appendix B: FLSDRF, 1999, 2004; DGRF, 2015	200 m inland along the coastline within settlements;	The same as for the fishery protection zones and further bans on: • any mining activities • storage and use of pesticides and agrochemicals
Littoral protection strip	Appendix B: WCSDRF, 2006; DGRF, 2015, 2018	200 m inland along the coastline	The same as for the fishery protection zone and further bans on: • plowing of land • placement of dumps of eroded soil • farm animal grazing and bathing
Pribaikalsky National Park (PBNP)	Appendix B: LCSDRF, 2001 (Art. 95)	4173 km^2	Bans on: • provision of land plots for gardening, truck farming, individual garage and/or individual housing construction outside of settlements • construction of roads, pipelines, power lines and other communications; construction and operation of industrial, economic and residential facilities not directly related to PBNP • movement and parking of motor vehicles not related to the operation of PBNP
	Appendix B: FLSDRF, 1995; Statute, 2009		Zones with special regimes: • Strictly protected zone • Recreation and educational tourism zone • Economic zone • Zone of traditional extensive nature management

References

7ka, 2018. 'Olkhon residents are shocked: houses will appear on the site of a pine forest'. (Zhiteli Olkhona shokirovany: na meste sosnovogo bora poyavyatsya doma). 7ka.tv. 5 June 2018. URL: ⟨http://7ka.tv/news/71388⟩ (Accessed 3 May 2021) (in Russian).

Antipov, A.N., Kravchenko, V.V., Semenov, Yu.M., Drozdov, A.V., Gagarinova, O.V., Fedorov, V.N., Rogovskaya, N.V., Plyusnin, V.M., Suvorov, E.G., Winkelbrandt, A., Milken, W., von Haaren, C., Schiller, J., Wende, W., Neumann, A., Ohlenburg, H., Hoppenstedt, A., 2006. Landscape Planning: Tools and Experience in Implementation. V.B. Sochava Institute of Geography SB RAS Publishers, Irkutsk, 149 pp.

Baikal Interregional Environmental Prosecutor's Office (BIEPO), 2018. 'Inspections of recreation facilities on Olkhon have revealed massive violations of legislation on the protection of Lake Baikal'. (Proverki ob'ektov rekreatsii na Olkhone vyyavili massovye narusheniya zakondatelstva ob okhrane ozera Baikal). Baikal Interregional Environmental Prosecutor's Office. 1 June 2018. URL: ⟨https://epp.genproc.gov.ru/ru/web/bmtp/mass-media/news/archive?item=37333616⟩ (Accessed 3 May 2021) (in Russian).

Bakulev, M., 2018. 'Olkhon-style lawlessness'. (Bezzakonie po-olkhonski). Babr24.com. 13 Dec 2018. URL: ⟨http://babr24.com/irk/?IDE=183945⟩ (Accessed 3 May 2021) (in Russian).

Bastos Lima, M.G., Persson, M.U., Meyfroidt, P., 2019. Leakage and boosting effects in environmental governance: a framework for analysis. Environ. Res. Lett. 14, 105006 https://doi.org/10.1088/1748-9326/ab4551.

Berezina, E., Shterman, I., 2018. 'Baikal became crowded'. (Baikalu stalo tesno). RG.RU. 25 Apr 2018. URL: ⟨https://rg.ru/2018/04/25/novye-granicy-vodoohrannoj-zony-bajkala-vyzyvaiut-voprosy.html⟩ (Accessed 3 May 2021) (in Russian).

Bernat, G., Boross, N., Somogyi, B., Vörös, L., G.-Toth, L., Boros, S., 2020. Oligotrophication of Lake Balaton over a 20-year period and its implications for the relationship between phytoplankton and zooplankton biomass. Hydrobiol 847, 3999–4013. https://doi.org/10.1007/s10750-020-04384-x.

Bondarenko, N.A., Tomberg, I.V., Pen'kova, O.G., Sheveleva, N.G., 2023. Structural Changes of Phyto- and Zooplankton under the Influence of Climate Change and Anthropogenic Load (Lake Baikal, Russia). Inland Water Biol. 16, 955–966. https://doi.org/10.1134/S1995082923060056.

Brown, K.P., Gerber, A., Bedulina, D., Timofeyev, M.A., 2021. Human impact and ecosystemic health at Lake Baikal. WIREs Water 8, e1528. https://doi.org/10.1002/wat2.1528.

Chistyakova, V., 2019. 'Billions bill. Why the Baikal protection program failed'. (Schet na milliardy. Pochemy provalilas programma po okhrane Baikala). IRK.ru. 8 Jan 2019. URL: ⟨https://www.irk.ru/news/articles/20190108/program/⟩ (Accessed 3 May 2021) (in Russian).

Emerson, R.M., 1962. Power-dependence relations. Am. Socio Rev. 27, 31–41. https://doi.org/10.2307/2089716.

FederalPress, 2011. 'Olkhon does not believe in depression'. (Olkhon depressiyam ne verit). FederalPress. 18 Aug 2011. URL: ⟨http://fedpress.ru/article/1210854⟩ (Accessed 3 May 2021) (in Russian).

Folke, C., Pritchard, L., Berkes, F., Colding, J., Svedin, U., 1998. The problem of fit between ecosystems and institutions. IHDP Working Paper No. 2. IHDP, Bonn.

Gallopín, G.C., 1994. Impoverishment and Sustainable Development: A Systems Approach. IISD, Winnipeg, 122 pp.

Gallopín, G.C., Gutman, P., Maletta, H., 1989. Global impoverishment, sustainable development, and the environment: A conceptual approach. Int. Soc. Sci. J. 121, 375–397.

GazetaIrkutsk, 2018. "The prosecutor's office prevented the illegal activities of the tourist sites "Like Home", "Kopylov's Estate" on Olkhon Island". (Prokuratura vosprepyatstvovala nezakonnoy deyatelnosti turob'ektov "Kak doma", "Usadba Kopylova" na ostrove Olkhon). GazetaIrkutsk.ru. 21 Nov 2018. URL: ⟨https://www.gazetairkutsk.ru/society/prokuratura-vosprepyatstvovala-nezakonnoj-deyatelnosti-turobektov-kak-doma-usadba-kopylova-na-ostrove-olhon⟩ (Accessed 3 May 2021) (in Russian).

Gel'man, V., 2021. Constitution, Authoritarianism, and Bad Governance: The Case of Russia. Russ. Polit. 6, 71–90. https://doi.org/10.30965/24518921-00601005.

Gollata, J.A.M., Newig, J., 2017. Policy implementation through multilevel governance: analysing practical implementation of EU air quality directives in Germany. J. Eur. Public Policy 24, 1308–1327. https://doi.org/10.1080/13501763.2017.1314539.

Government of Russian Federation, 2018. "On changing the boundaries of the water protection zone of Lake Baikal". (Ob izmenenii granits vodookhrannoy zony ozera Baykal). Government of Russian Federation. 23 March 2018. URL: ⟨http://government.ru/docs/31936/⟩ (Accessed 3 May 2021) (in Russian).

Gren, I.M., 2008. Cost effectiveness and fairness of the HELCOM Baltic Sea Action Plan against eutrophication. Vatten 64, 273–281.

Hudson, B., Hunter, D., Peckham, S., 2019. Policy failure and the policy-implementation gap: can policy support programs help? Policy Des. Pract. 2, 1–14. https://doi.org/10.1080/25741292.2018.1540378.

Ibisch, R., Westphal, K., Borchardt, D., Rouillard, J., Lukat, E., Boteler, B., Solheim, A.L., Austnes, K., Leujak, V., Schmedtje, U., 2016. European assessment of eutrophication abatement measures across land-based sources, inland, coastal and marine waters. ETC/ICM Technical Report 2/2016, 98 pp.

Infpol, 2017. "The increase in Chinese tourists by 208 percent on Baikal did not bring profit". (Prirost kitayskikh turistov v 208 protsentov na Baikale ne prines pribyli). Infpol.ru. 10 Oct 2017. URL: (Accessed ⟨https://www.infpol.ru/106913-prirost-kitayskikh-turistov-na-baykale-ne-prines-pribyli/⟩ 3 May 2021) (in Russian).

IRK.ru, 2017a. 'The Prosecutor General's Office of the Russian Federation: 50 tourist centers that violate the law were identified in the Olkhonsky District'. (Genprokuratura RF: V Olkhonskom rayone vyyavleno 50 turbaz, narushayushchikh zakonodatelstvo). IBK.ru. 2 Nov 2017. URL: ⟨https://www.irk.ru/news/20171102/tourism/⟩ (Accessed 3 May 2021) (in Russian).

IRK.ru, 2017b. 'Prosecutor's office: anthropogenic load on Khuzhir exceeded by 107%'. (Prokuratura: antropogennaya nagruzka na Khuzhir prevyshena na 107%). IBK.ru. 7 Nov 2017. URL: ⟨https://www.irk.ru/news/20171107/olhon/⟩ (Accessed 3 May 2021) (in Russian).

Irkutskaya Oblast, 2016. 'Chinese investors are ready to invest in the development of tourism in the Irkutsk region'". (Kitayskie investory gotovy vkladyvat dengi v razvitie turisma Irkutskoy oblasti). Irkutskaya Oblast, official portal. 17 May 2016. URL: ⟨http://irkobl.ru/news/203084/⟩ (Accessed 3 May 2021) (in Russian).

Istvánovics, V., Clement, A., Somlyódy, L., Specziár, A., G.-Tóth, L., Padisák, J., 2007. Updating water quality targets for shallow Lake Balaton (Hungary), recovering from eutrophication. Hydrobiol 581, 305–318. https://doi.org/10.1007/s10750-006-0509-1.

Järv, H., Shkaruba, A., Likhacheva, O., Kireyeu, V., Ward, R., Sepp, K., 2021. A tale of two protected areas: "value and nature conservation" in comparable national parks in Estonia and Russia. Land 10, 274. https://doi.org/10.3390/land10030274.

Jetoo, S., 2018. Barriers to effective eutrophication governance: A comparison of the Baltic Sea and North American Great Lakes. Water 10, 400. https://doi.org/10.3390/w10040400.

Khuzhir Duma, 2018a. The program of integrated socio-economic development of the Khuzhir Municipality of the Olkhonsky district of the Irkutsk region for 2019-2023'. (Programma kompleksnogo sotsialno-ekonomicheskogo razvitiya Khuzhirskogo munitspalnogo obrazovaniya Olkhonskogo rayona Irkutskoy oblasti na 2019-2023 gody). Khuzhir, 66 pp. URL: ⟨http://xn——7sbmjkv5avr.xn–p1ai/tinybrowser/files/pkser/programma-huzhirskoe-mo.pdf⟩ (Accessed 3 May 2021) (in Russian).

Khuzhir Duma, 2014. 'Comprehensive program for the development of the communal infrastructure system of the Khuzhir Municipality of the urban settlement of the Olkhonsky district of the Irkutsk region'. (Kompleksnaya programma razvitiya systemy kommunalnoy infrastructury Khuzhirskogo munitsipalnogo obrazovaniya gorodskogo poseleniya Olkhonskogo rayona Irkutskoy oblasti). Khuzhir, 62 pp. URL: ⟨http://xn——7sbmjkv5avr.xn–p1ai/tinybrowser/files/kommunal-n-progr/programma_pkr2_huzhir.doc⟩ (Accessed 3 May 2021) (in Russian).

Khuzhir Duma, 2018b. 'The strategy of socio-economic development of Khuzhir Municipality until 2030'. (Strategiya socialno-ekonomicheskogo razvitiya Khuzhirskogo munitsipalnogo obrazovaniya do 2030 goda). Khuzhir, 80 pp. URL: ⟨http://xn——7sbmjkv5avr.xn–p1ai/tinybrowser/files/pkser/file.2.docx⟩ (Accessed 3 May 2021) (in Russian).

Kobanova, G.I., Takhteev, V.V., Rusanovskaya, O.O., Timofeyev, M.A., 2016. Lake Baikal Ecosystem Faces the Threat of Eutrophication. Int. J. Ecol. 2016, 6058082 https://doi.org/10.1155/2016/6058082.

Korytny, L.M., Evstropyeva, O.V., 2018. On the developing the rules for organization of tourism and recreation in the central ecological zone of the Baikal Natural Territory. Serv. Tour.: Curr. Chall. 12, 31–42. https://doi.org/10.24411/1995-0411-2018-10303.

Kravtsova, L.S., Izhboldina, L.A., Khanaev, I.V., Pomazkina, G.V., Rodionova, E.V., Domysheva, V.M., Sakirko, M.V., Tomberg, I.V., Kostornova, T.Y., Kravchenko, O.S., Kupchinsky, A.B., 2014. Nearshore benthic blooms of filamentous green algae in Lake Baikal. J. Gt. Lakes Res. 40, 441–448. https://doi.org/10.1016/j.jglr.2014.02.019.

Kravtsova, L.S., Mizandrontsev, I.B., Vorobyova, S.S., Izhboldina, L.A., Mincheva, E.V., Potyomkina, T.G., Golobokova, L.P., Sakirko, M.V., Triboy, T.I., Khanaev, I.V., Sherbakov, D.Yu, Fedorov, A.P., 2019. Influence of water motion on the spatial distribution of *Spirogyra* in Lake Baikal. J. Gt. Lakes Res. 46, 29–40. https://doi.org/10.1016/j.jglr.2019.09.004.

Kryshkina, L., 2017. 'Who is destroying tourism on Lake Baikal? Open letter from tour operators'. (Kto unichtozhaet turism na Baikale? Otkrytoe pismo turoperatorov). Babr24.com. 11 Dec 2017. URL: ⟨http://babr24.com/baik/?IDE⟩= (Accessed 3 May 2021) (in Russian).

Kryshkina, L., 2018. 'Resolution of the rally against the ban on construction on the shores of Lake Baikal'. (Resolyutsiya mitinga protiv zapreta na stroitelstvo na beregakh Baikala). Babr24.com. 24 Dec 2018. URL: ⟨http://babr24.com/?IDE=184297⟩ (Accessed 3 May 2021) (in Russian).

Kuznetsov, G., 2009. 'Good intentions. Serious amendments are planned to the Law "On the Protection of Lake Baikal". (Blagie namereniya. V zakon "Ob okhrane ozera Baikal" planiruetsya vnesti sereznye popravki). Baikalarea.ru. 9 Dec 2009. URL: ⟨http://baikalarea.ru/baikal/a8193.htm⟩ (Accessed 3 May 2021) (in Russian).

Latynina, S., 2015. 'Signal received. Vladimir Putin heard alarm calls from Baikal'. (Signal prinyat. Vladimir Putin uslyshal trevozhnye zvonki s Baikala). IRK.AIF.RU. 1 Dec 2015. URL: ⟨https://irk.aif.ru/society/signal_prinyat_vladimir_putin_uslyshal_trevozhnye_zvonki_s_baykala⟩ (Accessed 3 May 2021) (in Russian).

Latynina, S., 2016. 'The edge of disaster. Baikal needs another water protection zone'. (Grani bedstviya. Baykalu nuzhna drugaya vodookhrannaya zona). IRK.AIF.RU. 27 Jan 2016. URL: ⟨https://irk.aif.ru/society/grani_bedstviya_baykalu_nuzhna_drugaya_vodoohrannaya_zona⟩ (Accessed 3 May 2021) (in Russian).

Levasheva, M.V., 2016. Problems Related to the Development of Recreational Potential of Olkhon Island in the Context of the Implementation of the Concept of Ecological Tourism. Bull. Irkutsk State Univ. Ser. Earth Sci. 18, 56–68.

Leventon, J., 2014. Explaining implementation deficits through multi-level governance in the EU's new member states: EU limits for arsenic in drinking water in Hungary. J. Environ. Plan. Manag. 58, 1137–1153. https://doi.org/10.1080/09640568.2014.916611.

Mamontova, A. (Ed.), 2018. 'The court banned the operation of the buildings of the tourist center "Baikalov Ostrog" on Olkhon"'. (Sud zapretil ekspluatatsiuy zdaniy turbazy "Baikalov Ostrog" na Olkhone). The Village. 2 Aug 2018. URL: ⟨https://www.the-village.ru/city/news/320637-baykalov-ostrog⟩ (Accessed 3 May 2021) (in Russian).

Mamontova, Y., 2014. 'Tourists are counted in the fall: The Environmental Prosecutor's Office conducted a check on Olkhon'. (Turistov po oseni schitayut. Prirodookhrannaya prokuratura provela proverku na Olkhone). Oblastnaya. 12 Sep 2014. URL: ⟨http://www.ogirk.ru/2014/9/12/46135/⟩ (Accessed 3 May 2021) (in Russian).

McGinnis, M.D., 2011. An Introduction to IAD and the Language of the Ostrom Workshop: A Simple Guide to a Complex Framework. Policy Stud. J. 39, 169–183. https://doi.org/10.1111/j.1541-0072.2010.00401.x.

Molm, L.D., 1990. Structure, action, and outcomes: The dynamics of power in social exchange. Am. Sociol. Rev. 55, 427–447. https://doi.org/10.2307/2095767.

Moon, S., 2019. Power in global governance: an expanded typology from global health. Glob. Health 15, 74. https://doi.org/10.1186/s12992-019-0515-5.

NAFI, 2018. 'Residents of the coastal territory of Lake Baikal are ambiguous about the narrowing of the water protection zone'. (Zhiteli pribrezhnoy territorii Baikala neodnoznachno otnosyatsya k suzheniyu vodookhrannoy zony). NAFI: Analytical center. 20 Feb 2018. URL: ⟨https://www.nafi.ru/analytics/zhiteli-pribrezhnoy-territorii-baykala-neodnoznachno-otnosyatsya-k-suzheniyu-vodookhrannoy-zony/⟩ (Accessed 3 May 2021) (in Russian).

Niedziałkowski, K., Blicharska, M., Mikusiński, G., Jędrzejewska, B., 2014. Why is it difficult to enlarge a protected area? Ecosystem services perspective on the conflict around the extension of the Białowieża National Park in Poland. Land Use Policy 38, 314–329. https://doi.org/10.1016/j.landusepol.2013.12.002.

Nikitina, O., 2016. 'Supervision over Lake Baikal has increased'. (Nad Baikalom usililsya nadzor). Kommersant. 16 Nov 2016. URL: ⟨https://www.kommersant.ru/doc/3144620⟩ (Accessed 3 May 2021) (in Russian).

O'Toole Jr., L.J., Hanf, K., 1998. Hungary: Political Transformation and Environmental Challenge. Environ. Politics. 7, 93–112. https://doi.org/10.1080/09644019808414374.

Ostrom, E., 1990. Governing the Commons: The Evolution of Institutions for Collective Action. New York: Cambridge University Press, 280 pp.

Ostrom, E., 2009. A general framework for analysing sustainability of social-ecological systems. Science 325, 419–422. https://doi.org/10.1126/science.1172133.

Paavola, J., 2007. Institutions and environmental governance: A reconceptualisation. Ecol. Econ. 63, 93–103. https://doi.org/10.1016/j.ecolecon.2006.09.026.

Paavola, J., Gouldson, A., Kluvánková-Oravská, T., 2009. Interplay of actors, scales, frameworks and regimes in the governance of biodiversity. Environ. Policy Gov. 19, 148–158. https://doi.org/10.1002/eet.505.

Peters, B.G., 2017. What is so wicked about wicked problems? A conceptual analysis and a research program. Policy Soc. 36, 385–396. https://doi.org/10.1080/14494035.2017.1361633.

Presidential Council on Civil Society Development and Human Rights (Presidential Council), 2018. 'The council will sort out complaints about massive violations of the rights of residents of the Olkhonsky district of the Irkutsk region'. (SPCh razberetsya v zhalobakh na massovye narusheniya prav zhiteley Olkhonskogo rayona Irkutskoy oblasti). Presidential Council on Civil Society Development and Human Rights. 13 Dec 2018. URL: ⟨http://president-sovet.ru/presscenter/news/read/5128/⟩ (Accessed 3 May 2021) (in Russian).

Ryabtev, V., 2017c. 'Russian-Chinese conflict" on Baikal'. (Rossiysko-kitayskiy konflikt na Baikale). Activatica. 8 Dec 2017. URL: ⟨http://activatica.org/blogs/view/id/4208/title/rossiysko-kitayskiy-konflikt-na-baykale⟩ (Accessed 3 May 2021) (in Russian).

Ryabtsev, V., 2014a. 'How to build a "house of your dream" on the Baikal coast'. (O tom, kak postroit "domik svoey mechty" na baikalskom beregu). Lifejournal. 26 Aug 2014. URL: ⟨https://vryabtsev.livejournal.com/6719.html⟩ (Accessed 3 May 2021) (in Russian).

Ryabtsev, V., 2014b. 'The consequences of tourism for the nature of Lake Baikal. Olkhon Island'. (Posledstviya turisma dlya prirody Baykala. Ostrov Olkhon). Lifejournal. 1 Oct 2014. URL: ⟨https://vryabtsev.livejournal.com/9055.html⟩ (Accessed 3 May 2021) (in Russian).

Ryabtsev, V., 2015a. 'The realities of one of the federal protected areas'. (Realii odnoy iz federalnykh OOPT). Lifejournal. 13 Oct 2015. URL: ⟨https://vryabtsev.livejournal.com/22986.html⟩ (Accessed 3 May 2021) (in Russian).

Ryabtsev, V., 2015b. 'We will build everything!' (Zastroim vse). Lifejournal. 2 Oct 2015. URL: ⟨https://vryabtsev.livejournal.com/22003.html⟩ (Accessed 3 May 2021) (in Russian).

Ryabtsev, V., 2017a. 'Baikal is seriously ill with "construction fever"'. (Baikal tyazhelo bolen stroitelnoy likhoradkoy). Activatica. 27 Sep 2017. URL: ⟨http://activatica.org/blogs/view/id/3961/title/baykal-tyazhelo-bolen-stroitelnoy-lihoradkoy⟩ (Accessed 3 May 2021) (in Russian).

Ryabtsev, V., 2017b. 'In defense of the Shaman forest'. (V zashchitu shamanskogo lesa). Activatica. 21 Nov 2017. URL: ⟨http://activatica.org/blogs/view/id/4145/title/v-zashchitu-shamanskogo-lesa⟩ (Accessed 3 May 2021) (in Russian).
Ryabtsev, V., 2017d. 'What is more important: tourist business or Baikal?' (Chto vazhnee: turbiznes ili Baikal). Activatica. 26 Dec 2017. URL: ⟨http://activatica.org/blogs/view/id/4293/title/chto-vazhnee-turbiznes-ili-baykal⟩ (Accessed 3 May 2021) (in Russian).
Ryabtsev, V., 2018a. 'A rally in defense of the development and sale of the shores of Lake Baikal?' (Miting v zashchitu zastroyki i prodazhi beregov Baykala). Activatica. 18 Dec 2018. URL: ⟨http://activatica.org/blogs/view/id/6029/title/miting-v-zashchitu-zastroyki-i-prodazhi-beregov-baykala⟩ (Accessed 3 May 2021) (in Russian).
Ryabtsev, V., 2018b. 'Darkness is growing over Baikal'. (Nad Baikalom sgushchaetsya tma). Ecodelo. 11 Dec 2018. URL: ⟨https://ecodelo.org/rossiyskaya_federaciya/sibirskiy_fo/irkutskaya_oblast/44384-nad_baykalom_sgushchaetsya_tma⟩ (Accessed 3 May 2021) (in Russian).
Ryabtsev, V., 2018c. 'Rally in Elantsy - an example of a staged "protest"'. (Miting v elancah – primer srezhissirovannogo protesta). Activatica. 25 Dec 2018. URL: ⟨http://activatica.org/blogs/view/id/6061/title/miting-v-elancah-primer-srezhissirovannogo-protesta⟩ (Accessed 3 May 2021) (in Russian).
Ryabtsev, V., 2018d. 'The most expensive land is "excluded" from the Pribaikalsky National Park?' (Iz pribaykalskogo nacionalnogo parka vnov isklyuchayut samuyu doroguyu zemlyu). Activatica. 8 Feb 2018. URL: ⟨http://activatica.org/blogs/view/id/4482/title/iz-pribaykalskogo-nacionalnogo-parka-vnov-isklyuchayu-samuyu-doroguyu-zemlyu⟩ (Accessed 3 May 2021) (in Russian).
Ryabtsev, V., 2019. "Gordian knot" of Olkhon problems. (Gordiev uzel olhonskih problem). Ecodelo. 4 March 2019. URL: ⟨https://ecodelo.org/rossiyskaya_federaciya/sibirskiy_fo/irkutskaya_oblast/44498-gordiev_uzel_olhonskih_problem⟩ (Accessed 3 May 2021) (in Russian).
Sandle, M., 1998. A Short History of Soviet Socialism. Routledge, London, 480 pp.
Scavia, D., Allan, J.D., Arend, K.K., Bartell, S., Beletsky, D., Bosch, N.S., Brandt, S.B., Briland, R.D., Daloğlu, I., DePinto, J.V., Dolan, D.M., Evans, M.A., Farmer, T.M., Goto, D., Han, H., Höök, T.O., Knight, R., Ludsin, S.A., Mason, D., Michalak, A.M., Richards, R.P., Roberts, J.J., Rucinski, D.K., Rutherford, E., Schwab, D.J., Sesterhenn, T.M., Zhang, H., Zhou, Yu, 2014. Assessing and addressing the re-eutrophication of Lake Erie: Central basin hypoxia. J. Gt. Lakes Res. 40, 226–246. https://doi.org/10.1016/j.jglr.2014.02.004.
Shkaruba, A., Kireyeu, V., 2013. Recognising ecological and institutional landscapes in adaptive governance of natural resources. . Policy Econ. 36, 87–97. https://doi.org/10.1016/j.forpol.2012.10.004.
Shkaruba, A., Skryhan, H., 2019. Chernobyl science and politics in Belarus: The challenges of post-normal science and political transition as a context for science–policy interfacing. Environ. Sci. Policy 92, 152–160. https://doi.org/10.1016/j.envsci.2018.11.024.
Shkaruba, A., Skryhan, H., Likhacheva, O., Kireyeu, V., Katona, A., Shyrokostup, S., Sepp, K., 2021. Environmental drivers and sustainable transition of dachas in Eastern Europe: an analytical overview. Land Use Policy 100, 104887. https://doi.org/10.1016/j.landusepol.2020.104887.
SIA, 2018. 'The Russian government has excluded the territories of settlements from the boundaries of the water protection zone of Lake Baikal'. (Pravitelstvo RF isklyuchilo territorii naselennykh punktov iz granits vodookhrannoy zony ozera Baikal). SIA. 3 Apr 2018. URL: ⟨http://sia.ru/?section=484&action=show_news&id=357262⟩ (Accessed 3 May 2021) (in Russian).
Sibir Realii, 2018. 'Baikal: residents will hold a rally against the construction ban'. (Baikal: zhiteli provedut miting protiv zapreta na stroitelstvo). Sibir.Realii. 11 Dec 2018. URL: ⟨https://www.sibreal.org/a/29649381.html⟩ (Accessed 3 May 2021) (in Russian).
TASS, 2016. 'The new program for the development of Baikal suggests increasing the tourist flow to 5 million by 2025'. (Novaya programma po razvitiyu Baikala predpolagaet uvelichit turpotok do 5 mln k 2025 gody). TASS. 6 Sep 2016. URL: ⟨https://tass.ru/obschestvo/3598550⟩ (Accessed 3 May 2021) (in Russian).
TASS, 2017a. 'The Cabinet of Ministers will launch a project to preserve Lake Baikal in 2018'. (Kabmin zapustit proekt po sokhraneniyu Baikala v 2018 gody). TASS. 27 July 2017. URL: ⟨https://tass.ru/sibir-news/4444436⟩ (Accessed 3 May 2021) (in Russian).
TASS, 2017b. 'Yuri Chaika created the Baikal Environmental Prosecutor's Office'. (Yuriy Chayka sozdal Baykalskuyu prirodookhrannuyu prokuraturu). TASS. 1 Nov 2017. URL: ⟨https://tass.ru/obschestvo/4694624⟩ (Accessed 3 May 2021) (in Russian).
Tayga, 2018. 'Residents of the Baikal region opposed the ban on construction near the lake. Environmentalist explains why they are wrong'. (Zhiteli Pribaykalya vystupili protiv zapreta na stroitelstvo okolo ozera. Ekolog ob'yasnyaet, pochemu oni ne pravy). Tayga.info. 25 Dec 2018. URL: ⟨https://tayga.info/144316⟩ (Accessed 3 May 2021) (in Russian).
Termeer, C.J.A.M., Dewulf, A., Biesbroek, R., 2019. A critical assessment of the wicked problem concept: relevance and usefulness for policy science and practice. Policy Soc. 38, 167–179. https://doi.org/10.1080/14494035.2019.1617971.
Timoshkin, O., 2018. Coastal zone of the world's great lakes as a target field for interdisciplinary research and ecosystem monitoring: Lake Baikal (East Siberia). Limnol. Freshw. Biol. (1), 81–97. https://doi.org/10.31951/2658-3518-2018-A-1-81.
Timoshkin, O.A., Samsonov, D.P., Yamamuro, M., Moore, M.V., Belykh, O.L., Malnik, V. V., Sakirko, M.V., Shirokaya, A.A., Bondarenko, N.A., Domysheva, V.M., Fedorova, G.A., Kochetkov, A.I., Kuzmin, A.V., Lukhnev, A.G., Medvezhonkova, O. V., Nepokrytykh, A.V., Pasynkova, E.M., Poberezhnaya, A.E., Potapskaya, N.V., Rozhkova, N.A., Sheveleva, N.G., Tikhonova, I.V., Timoshkina, E.M., Tomberg, I.V., Volkova, E.A., Zaitseva, E.P., Zvereva, Yu.M., Kupchinsky, A.B., Bukshuk, N.A., 2016. Rapid ecological change in the coastal zone of Lake Baikal (East Siberia): Is the site of the world's greatest freshwater biodiversity in danger? J. Gt. Lakes Res. 42, 487–497. https://doi.org/10.1016/j.jglr.2016.02.011.
Tokareva, V., 2016. 'Baikal reservation: How residents of Buryatia were restricted in their rights in the fight for the environment'. (Baikalskaya rezervatsiya: Kak zhiteley Buryatii ogranichili v pravakh v borbe za ekologiyu). Lenta.ru. 23 March 2016. URL: ⟨https://lenta.ru/articles/2016/03/23/baikal/⟩. (Accessed 3 May 2021) (in Russian).
Tsvigun, I., Kubasova, T., Rubtsova, N., 2020. The tourism sector of the Baikal region from the perspective of Russian-Chinese cooperation: Opportunities and threats to the sustainable development of the region. Proceedings of the International Scientific Conference 'Far East Con' (ISCFEC 2020). Series: Advances in Economics, Business and Management Research 128. https://dx.doi.org/10.2991/aebmr.k.200312.249.
Tulokhonov, A.K., 2009. (Ed.)'Encyclopedic reference book "Baikal: nature and people"'. (Baikal: priroda I lyudi. Entsiklopedicheskiy spravochnik). ECOS, Ulan-Ude, 608 pp. (in Russian).
Turnbull, N., Hoppe, R., 2019. Problematizing 'wickedness': A critique of the wicked problems concept, from philosophy to practice. Policy Soc. 38, 315–337. https://doi.org/10.1080/14494035.2018.1488796.
Vedomosty, 2017. 'Putin instructed to eliminate the consequences of the activities of the Baikal Pulp and Paper Mill'. (Putin poruchil likvidirovat posledstviya deyatelnosti Baikalskogo TsBK). Vedomosty. 17 Aug 2017. URL: ⟨https://www.vedomosti.ru/business/news/2017/08/17/729950-putin-baikalskogo⟩ (Accessed 3 May 2021) (in Russian).
Voronov, A., 2023. 'Baikal is invited to an axe'. (Baikal zovut k toporu). Kommersant. 12 Jul 2016. URL: ⟨https://www.kommersant.ru/doc/6097229⟩ (Accessed 27 November 2023) (in Russian).
Znamenskaya, T.I., Vanteeva, Y.V., Solodyankina, S.V., 2018. Digression of vegetation and soils of coastal landscapes of Lake Baikal through the examples of attractive tourism areas. Serv. Tour.: Curr. Chall. 12, 75–86. https://doi.org/10.24411/1995-0411-2018-10307.