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Conflicting rationalities limit the uptake of spatial conservation prioritizations

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Spatial conservation prioritization offers a scientific framework for decision-making, yet its practical uptake remains limited. Here, I argue that incorporating social and political dimensions into conservation prioritization — rather than focusing solely on technical and economic aspects — would enhance progress towards biodiversity targets by ensuring closer alignment with real-world governance dynamics.

Spatial conservation prioritization (SCP) — also referred to as systematic conservation planning[1] or spatial conservation planning[2] — is a scientific approach for guiding conservation planning. By leveraging the best available data and methodologies, SCP facilitates transparent and cost-effective decision-making and could critically support the Kunming-Montreal Global Biodiversity Framework 30 × 30 targets. However, despite its technical strengths, the practical implementation of spatial prioritization tools remains limited, which raises concerns about their real-world usefulness in meeting conservation commitments.

A key reason for this limited uptake is that SCP frameworks primarily focus on technical effectiveness and, sometimes, economic efficiency, and typically neglect social and political considerations that influence decision-making. Social factors (such as community needs and local livelihoods) and political dynamics (including the necessity of support from influential actors) shape conservation outcomes in ways that scientific models cannot capture. Without accounting for these factors, spatial prioritization remains detached from policy implementation.

In this Comment, I argue that SCP protocols should be clearly reframed as decision-support tools rather than prescriptive solutions. Embedding social and political considerations into prioritization frameworks is essential to bridging the gap between research and practice. Without this integration, spatial prioritization will continue to face low adoption rates, which risks the failure of 30 × 30 targets, similar to previous international conservation frameworks that struggled owing to misalignments among science and policy[3].

Conflicting rationalities

In a classic essay, Simon[4] defined rationality as the selection of alternatives that best serve preselected goals, given the values, constraints and available information. Values represent the degree of importance assigned to principles, goods, services or other entities, and constraints refer to the practical limitations — such as legal, financial or biophysical restrictions — that influence the feasibility of decisions. In this context, rationality determines how values and constraints are weighed in decision-making.

Scientific protocols for SCP help decision-makers to navigate complex data, by integrating values and constraints to optimize conservation outcomes[1,2]. However, conservation decisions involve multiple types of rationality (technical, economic, social and political), each weighting values and constraints differently — which can lead to conflicts.

Technical rationality focuses on selecting the best means to achieve a predetermined goal, and emphasizes optimization and effectiveness. In conservation, it involves meeting biodiversity targets through scientific data and computational models. Economic rationality centres on resource efficiency, and balances costs and benefits to achieve the biodiversity targets at minimal cost. Social rationality prioritizes community needs, social equity and public support, and acknowledges that different groups have conflicting interests, which makes a singular 'optimal' solution elusive[5]. Political rationality manages power dynamics, and often requires compromises that secure the support of key actors involved, including local communities, resource managers, landowners, nongovernmental organizations and various levels of government.

SCPs are conducted within complex sociopolitical landscapes. The standard protocol for conservation prioritization (Fig. 1, left) inadequately accounts for the sociopolitical pressures that shape policy decisions and can be perceived as 'power appropriation' that shifts decision-making authority from political actors to scientists. As a result, these approaches — although methodologically sound — can seem misaligned with the immediate concerns and values of local communities and political stakeholders.

Harmonizing SCP with social and political rationalities is essential for achieving long-term conservation success. Numerous authors have highlighted the persistent gap between research and implementation in conservation, and have observed that traditional forms of knowledge dissemination (such as publishing in academic journals or transferring skills to practitioners) are insufficient to ensure effective conservation policy[6]. Bridging this gap requires acknowledging its existence and making tangible changes, including co-development of all stages of conservation planning[7], and broadening social dimensions to reflect real-world complexities[8]. However, only 6% of 2,456 SCP case studies considered social dimensions in their processes[9], which underscores the need for a more integrated approach.

Scientifically driven conservation in a social–political context

The conventional SCP framework by Margules and Pressey[1] focuses on optimizing technical and economic rationalities to guide conservation

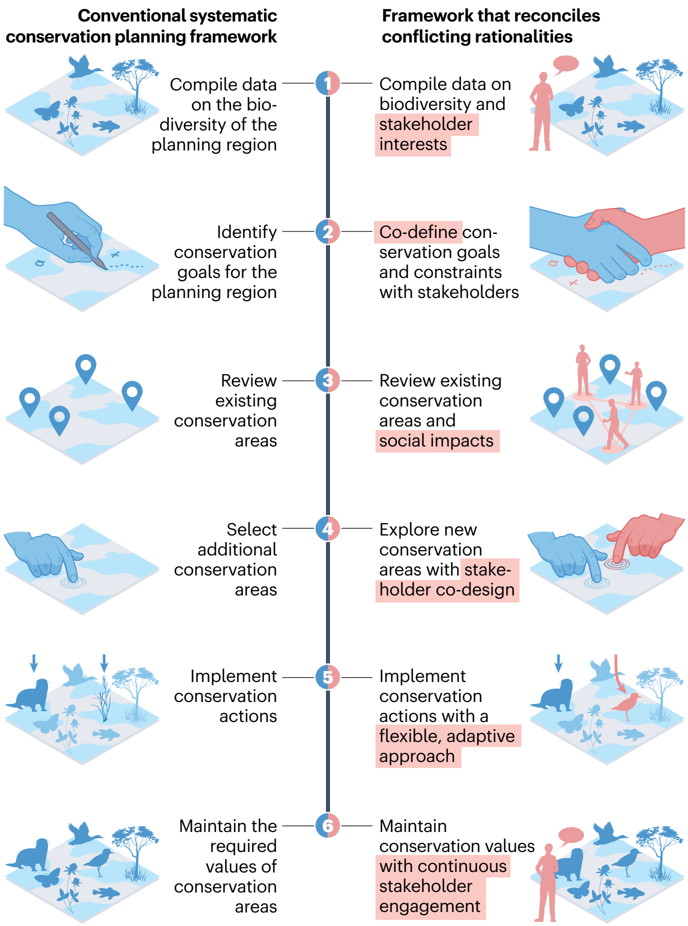

Fig. 1 | Towards a spatial conservation prioritization framework that reconciles conflicting rationalities. Left, the original framework by Margules and Pressey[1] was designed to optimize technical and economic rationalities. Right, the modified spatial conservation prioritization should move towards a framework that integrates social and political rationalities and engages multiple interest groups throughout the planning. Further details in Supplementary Table 1.

decisions. Although this model remains foundational, it overlooks the sociopolitical rationalities that are critical to success or failure. To bridge the rationality divide, the scientist-led protocol must evolve into a politically guided process, in which the relevant actors take ownership of decisions in collaboration with scientists (Fig. 1, Supplementary Table 1). A better framework promotes collaboration rather than relying solely on scientists to set priorities — an approach that does not inherently guarantee adequate choices.

Robust engagement with a variety of interest groups is essential in the modified framework. Although community involvement in conservation decision-making is not new, it should be better integrated throughout the six stages of SCP. This integration could involve, whenever appropriate, participation in data compilation, co-defining conservation goals, assessing the social effects of conservation areas, contributing to the prioritization of new conservation areas, implementing conservation actions and ensuring the long-term management of these areas (Fig. 1). By actively involving local communities, landowners, nongovernmental organizations, economic sector representatives and political leaders, the planning process builds trust and aligns conservation actions with social realities. Leaders of governmental agencies, acting as 'deal brokers', can mediate conflicting interests and balance technical and economic considerations with on-the-ground practicalities. This inclusive approach not only enhances legitimacy but also increases the likelihood of long-term feasibility, as stakeholders feel a sense of shared ownership over the resulting conservation measures.

In addition, SCP should embrace interactive scenario planning. Rather than proposing a single spatial conservation scenario, planners can develop multiple scenarios — each with distinct trade-offs and advantages. These scenarios can be co-created with the relevant actors using computational decision-support tools, and balancing targets for biodiversity protection with budgetary constraints and diverse land-use needs[10]. Scientists could present technically grounded options, while representatives of government agencies perform their mediating and balancing roles.

Beyond stakeholder engagement, conflict resolution and adaptive management must be central to the revised framework. In complex sociopolitical settings, disagreements among stakeholders and shifting environmental baselines can jeopardize even the best technical designs. Incorporating formal mechanisms for mediation and iterative learning helps stakeholders to negotiate solutions and adapt strategies as new information emerges. By monitoring ecological indicators alongside social metrics (such as community satisfaction), conservation measures can remain responsive and can reflect local conditions and needs over time.

Although participatory processes might demand greater upfront investments of time and resources, their long-term benefits often outweigh these initial costs. Early and ongoing engagement reduces resistance and conflicts that might otherwise derail initiatives. It also engenders a stronger sense of ownership among all parties, which makes conservation efforts more resilient to future political or social changes. Ultimately, this approach avoids the hidden expenses of failed or contested actions and lays the groundwork for stable, enduring conservation outcomes.

Looking ahead

The ease of implementing either the traditional SCP framework or a modified one will depend on context. In densely populated and politically complex regions, such as Europe[11,12], SCP is particularly difficult; it might be possible at smaller, national scales. Conversely, in marine systems where public ownership of marine territories reduces the number of competing claims, both technically driven prioritization approaches and those that incorporate sociopolitical rationalities probably have greater feasibility[13].

A framework that reconciles conflicting rationalities can strengthen conservation planning by explicitly balancing scientific rigour with social and political realities. Advances in decision-support technologies — particularly artificial intelligence and machine learning — can improve scenario planning by enabling more complex, rapid analyses and making these tools more accessible to planners and stakeholders. By embedding technical and economic rationalities in a participatory framework, conservation targets become both scientifically robust and socially acceptable. Ultimately, this integrated approach equips decision-makers to respond more effectively to evolving challenges, and helps to secure long-term biodiversity protection in a changing world.

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Additional information

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