

Integrating stakeholder values and ideas with trade-off analytics to achieve more optimal marine spatial plans

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Marine Spatial Planning (MSP) includes the development of ocean zones, areas that restrict human activities (Ehler & Douvère 2009). Marine protected areas, for example, are zones that limit or entirely eliminate fishing and other types of resource extraction. Likewise, aquaculture sites may exclude recreational boating or diving activities. As such, these zones impact the lives (if not the livelihoods) of stakeholders who value these spaces. For this reason, it is essential that marine spatial plans reflect stakeholder values and ideas for where ocean zones are located. Otherwise, plans are not likely to receive the support needed for legal adoption and compliance.

To ensure stakeholder values and ideas drive marine spatial plans in other regions, we have implemented collaborative geodesign techniques (McClintock 2013) that allow stakeholders to assign value to ocean spaces and freely explore and evaluate potential zoning schemes (Flower et al. 2020; Johnson et al. 2020). Beyond facilitating stakeholder buy-in to the design process, geodesign helps users understand geography holistically, understand the science criteria, identify shared and diverging interests and facilitates joint problem solving (Cravens 2016). In addition, user generated designs without guidance from computer-generated modes, cannot achieve optimality. Trade-off approaches (Lester et al. 2013), on the other hand, are a means of creating computer-generated optimal plans acknowledging that different sectors (ocean users or groups) have different objectives based on what marine resources they value (e.g., fisheries yield, ecosystem protection, etc).

Maximizing successful marine spatial planning in the Azores, therefore, should combine the geodesign and trade-off approaches, incorporating stakeholder values and opinions that have been informed by optimal, computer-generated designs. The conditions for success are very good given that participatory mapping techniques have shown great promise in the Azores (Seijo 2019), a participatory geodesign platform is available for the Azores (azores.seasketch.org) and trade-off approaches have matured.

Key words: GeoDesign; marine spatial planning; trade-offs; optimality; zones

Integrar os valores e ideias das partes interessadas com análise de trade-off para alcançar um ordenamento do espaço marítimo ideal

O ordenamento do espaço marítimo inclui o desenvolvimento de zonas oceânicas, áreas que restringem as atividades humanas (Ehler & Douvere 2009). As áreas marinhas protegidas, por exemplo, são zonas que limitam ou eliminam completamente a pesca e outros tipos de exploração de recursos. Da mesma forma, os locais de aquicultura podem excluir atividades recreativas ou mergulho. Como tal, essas zonas têm influência na vida (senão nos meios de subsistência) das partes interessadas que valorizam esses espaços. Por este motivo é essencial que o ordenamento espacial marítimo reflita os valores e ideias das partes interessadas sobre onde estão localizadas as zonas oceânicas. Caso contrário é provável que os planos não recebam o apoio necessário para a adoção e conformidade legais. Para garantir que os valores e as ideias das partes interessadas conduzam os planos espaciais marinhos em outras regiões, implementamos técnicas colaborativas de *geodesign* (McClintock 2013) que permitem que as partes interessadas atribuam valor aos espaços oceânicos e que explorem e avaliem livremente os potenciais esquemas de zonamento (Flower et al. 2020; Johnson et al. 2020). Para além de facilitar a adesão das partes interessadas ao processo de *design*, *geo-design* ajuda os utilizadores a entender a geografia de forma holística, a entender os critérios científicos, a identificar interesses partilhados e divergentes e a resolver problemas conjuntos (Cravens 2016). Além disso, os projetos criados pelo utilizador, sem orientação dos resultados gerados pelo computador, não podem alcançar a otimização. As abordagens de *trade-off* (Lester et al. 2013), por outro lado, são um meio de criar planos ótimos, gerados pelo computador, reconhecendo que diferentes setores (utilizadores dos oceanos ou grupos) têm objetivos diferentes de acordo com os recursos marinhos que valorizam (exp. rendimento da pesca, proteção do ecossistema, etc.).

A maximização do sucesso do ordenamento do espaço marítimo nos Açores, portanto, deve combinar as abordagens de *geo-design* e *trade-off*, incorporando valores e opiniões das partes interessadas que foram informados por projetos ótimos gerados por computador. As condições para o sucesso são muito boas, dado que as técnicas de mapeamento participativo mostraram grande potencial nos Açores (Seijo 2019), a plataforma participativa de *geo-design* está disponível para os Açores (azores.seasketch.org) e as abordagens de *trade-off* amadureceram.

Palavras chave: *Geo-design*; ordenamento do espaço marítimo; *trade-off*; otimização; zonas

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