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Principles and practice for the equitable governance of transboundary natural resources: cross-cutting lessons for marine fisheries management

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Abstract

Conflicts over the equitability of transboundary natural resource conservation and management schemes have created barriers to effective policy implementation and practice. In seeking to overcome these barriers in the context of progressing transboundary oceanic fisheries conservation, we explore the divide between equity as defined in principle and as applied in practice in international policy and law. Searching for cross-cutting lessons and themes, we first review multilateral environmental agreements to see how equity is commonly being defined, understood, and then applied in principle. From this analysis, we identify common elements that can facilitate the conceptual framing and application of equitable principles in practice. Framed within these elements, we then explore how applications of equitable principles have performed in two current transboundary conservation and management case studies in regional fisheries management and international climate change policy. From this analysis, we conclude with some lessons learned which show that finding solutions to equity-driven barriers to transboundary conservation, while challenging, are well within our existing capacity to develop and execute.

Introduction

Oceanic fisheries conservation and management agreements have broadly promoted benefit-driven, cooperative, and inter-generational approaches to resource use for decades. This is also the case for other transboundary terrestrial natural resources such as forests, rangelands, river basins, and clean air. These inclusive approaches are informed by the language and intent of numerous well-established international environmental agreements for sustainable development (e.g., LOSC 1982; UNCED 1992; UNMDG 2000; UNCSD 2012). However, best-written intentions can translate poorly into effective practice when it comes to the sustainable use of transboundary resources for which usage is rival, exclusion is difficult, and benefits and outcomes are shared (Rose et al. 1998; Berkes et al. 2003; Tonn 2003; Lodge et al. 2007; Ostrom 2007; Grafton et al. 2010; Sommerville et al. 2010).

Understanding what makes one conservation or management scheme a success in practice while another fails is a broadly-recognised challenge in the complex and

integrated whole of human and natural systems; i.e., social-ecological systems (SEs) (Berkes and Folke 1998). In terrestrial systems, a growing body of research recognizes that critical linkages between many of the successes and failures of environmental conservation action in SEs lie in the ability to relate key human social interactions to conservation outcomes (Gunderson et al. 1995; Berkes et al. 2003; Folke 2007; Ostrom 2007; Bodin and Crona 2009; Vollan and Ostrom 2010; Dandy et al. 2014). Similar linkages and lessons are now being explored in the marine environment (e.g., see Pollnac et al. 2010; López-Angarita et al. 2014; Österblom et al. 2013).

One key social interaction is the behaviour of resource stakeholders in response to the perceived fairness, or equity, of a given conservation and management scheme. These stakeholders are individuals, groups, or nation States with a direct interest in an environmental good or service. They can affect or be affected by the actions of others with similar interests. Global asymmetries in wealth, power, capacity, and need mean that the benefits and costs associated with tackling transboundary sustainable resource management and conservation challenges are experienced disproportionately among these diverse stakeholders. This disproportionality is acutely felt in the distribution of income, revenue, and livelihood cost burdens associated with imposing and observing limits on scarce and shared resources. In turn, this can create conflicts between stakeholders throughout the natural resources. These conflicts are capable of creating a genuine barrier to achieving timely and effective conservation outcomes.

While different shared transboundary resources have evident physical differences and exist across scales of governance, they can still share similarities in their broader human use characteristics. In seeking innovative solutions to these barriers to conservation, it is worthwhile exploring the efforts to equitably manage and conserve in broadly similar transboundary resource use environments. Pursuing one of many potential avenues of investigation in this regard, this paper focuses on shared transboundary resource use at an international, nation State-level scale. By applying an international law and policy perspective, it may be possible to identify valuable conceptual parallels, differences, and insights from analyses of principles in international law and shared conservation and management efforts. Analysis outcomes could in turn inform the further discourse necessary to develop more robust and equitable resource policy and governance arrangements.

We apply this perspective to explore two international transboundary resource use case studies that are currently grappling with equity issues as a barrier to their effective conservation and management. The first case study looks at the regulatory efforts made to equitably conserve and manage shared and highly migratory transboundary oceanic tuna stocks in the Western and Central Pacific Ocean (WCPO). The second case study provides a useful counterpoint from outside the maritime domain and briefly examines international regulatory efforts to equitably abate European greenhouse gas (GHG) emissions. Setting up the context for this analysis, we first look at how equity's concepts are being defined, understood, and then applied in international environmental resource law and policy. Shifting from principle to practice, we then focus on comparing the regulatory efforts of both case studies. This analysis is followed by a discussion of some of the 'lessons learned' from these approaches, with a particular focus on applications in transboundary marine fisheries management.

Defining equity: how do we know when ‘fair is fair’?

Concepts of equity, also interchangeably referred to as ‘fairness’ (Franck 1995; Shue 1999; Soltau 2009), have played a role in shaping human social norms for millennia. These social norms are the customary ‘rules’ that govern both prescribed and proscribed behavior in a given societal group and in a given social context (Bicchieri and Muldoon 2014). Common terminologies associated with ‘lay’ definitions of equity include ‘non-discrimination’, ‘fairness’, ‘impartiality’, and ‘playing by the rules’. Bronfenbrenner (1973) broadly defined equity as an ethical judgement consistent with socially-established principles of justice.

More technical and practicable definitions of equity are subject to much ongoing philosophical, political and legal debate; what is clear is that equity is a complex concept with a definition, intent, and application that varies depending on multiple situational and interpretive factors (Ringius et al. 2002; Shue 1996; Shelton 2007; Soltau 2009). Despite this recognised complexity and lack of a clear and unifying definition for ‘equity’, equitable concepts have persisted in the language of multilateral environmental agreements (MEAs) for decades (Shelton 2007). These international laws and regulatory policies provide a commonly accepted operational framework for addressing cooperation, compliance, and the appropriate use of international transboundary resources.

Equity concepts in international environmental law

While direct references to equity are few, much of the ‘equity-themed’ language in major terrestrial and aquatic MEAs refers to a need to avoid exacerbating the contextual disparities in circumstance between developed and developing countries both present and future (See examples: UNCHE 1972; LOSC 1982; UNCED 1992; UNFCCC 1994; UNFSA 1995). The United Nations Framework Convention on Climate Change (UNFCCC), for example, obliges developed countries to take the lead in protecting the climate system for the benefit of present and future generations “on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities” (Art. 3 (1), UNFCCC 1994).

Some MEAs recognise that equitable international policy approaches should take specific vulnerable groups into account. For example, the United Nations “Fish Stocks Agreement” Art. 24 (1, 2) (UNFSA 1995) requires parties to take into account the special requirements of developing States when adopting conservation and management measures, with particular references to food security, dependent and indigenous communities, and the need to ensure that measures do not transfer disproportionate burdens of conservation action on to developing States.

Equitable concepts are also present in international dispute settlement, but have yet to be exercised in practice (Shelton 2007). Article 38 (2) of the Statute of the International Court of Justice (ICJ), for example, provides that the Court may decide cases *ex aequo et bono* (i.e., from equity and conscience) “if the parties agree thereto” (Art. 38 (2), ICJ 1945).

Core elements of equity in transboundary natural resource policy

Responsibility, rights, and justice intersect to frame discussions about what equity is understood to mean in a given context and by whom, how it is used to inform decision-making, and why a given action, outcome, or context is considered ‘equitable’. This section focuses primarily on the distributive dimension of these elements.

Responsibility plays a critical role in apportioning accountability and assigning blame for action or inaction in resource conservation and management (Ringius et al. 2002). Assigned responsibility (i.e., a term which is generally synonymous with obligation or duty in international environmental law and policy) is associated with established international legal obligations such as ‘duty of care’ (Arbour 2008; Müller et al. 2009), a ‘duty to cooperate’ (e.g., such as through ‘good neighbourliness’ principles), a duty to avoid causing harm (e.g., such as through the precautionary principle) or to remediate harms (e.g., such as the polluter pays principle), a duty not to intervene in the domestic affairs of other States, and a duty to fulfil agreed-upon commitments ‘in good faith’ (United Nations 1970). Responsibility requires States, through the application of these international legal principles, to reconcile potentially incompatible or damaging interests peacefully and in good faith, and to remediate when harm has already taken place through their actions.

Rights represent a guarantee of freedoms and entitlements as well as of permissible actions (Wenar 2011). A product of prescriptive social norms, the ‘rules’ of rights interact with the ‘rules’ of responsibility to assist in procedural and substantive interpretations of what is ‘fair’ in a given context.

Looking at legal rights of conduct in an international transboundary resource context, the rival and often non-excludable nature of shared resource use means that clear stakeholder rights of privilege, power, claim, and immunity (for more on these theorised ‘base elements’ of rights see Hohfeld (1919)) can be difficult to identify or assert without overlaps and conflict. Conflicts over upstream and downstream transboundary watercourse use illustrate this challenge well (See example: *Case concerning the Gabčíkovo-Nagymaros Project* (Hungary v. Slovakia 1997). Because asserting a right gives no guidance on how it should be prioritised against another in cases of conflict, issues are often resolved by negotiating additional contractual and reciprocal rights and responsibilities through bilateral or multilateral treaties (e.g., such as the (EU Common Fisheries Policy 1970); (USA-Canada Air Quality Agreement 1991)). Occasionally, negotiation is not successful and the issue must be brought before the courts to establish new precedents (e.g., as in the *Gabčíkovo-Nagymaros* case above). In other cases, an absence of formal legal or institutional direction leads to the development of informal or ‘acquired’ customary rights. These are widely accepted as legitimate and non-discriminatory despite having no formally established legal authority (Ringius et al. 2002).

A third defining element of equity in shared resource conservation and management addresses the social justice facet of resource burden and benefit allocation. This paper is primarily concerned with the distributive aspects of social justice. However, the authors note that this is only one of a number of relevant applications of social justice worth exploring in relation to conservation issues. Indeed, some scholars argue that the social justice dimension of equity should be the driving force and primary focus of more effective conservation and management efforts (Hernes et al. 2005; Bundy et al. 2008).

Distributive justice supports the notion of ‘fair-sharing’, ‘equitable utilisation’ and “fair equality of opportunity” (Rawls 1999). It is “concerned with the distribution of the conditions and goods which affect individual well-being” (Deutsch 1975). Distributive justice also guides the procedural relationship between the equity of a decision-making process and the perceived equitability of its outcome; acting equitably in this context may include procedural duties to notify and consult (Shelton 2007).

It is not uncommon for equity and equality to be thought of as one and the same (Bronfenbrenner 1973; Parson and Zeckhauser 1993; Shue 1999; Ringius et al. 2002). While related, these concepts have some critical distinctions. Sovereign equality is a basic principle of international law. In context, this principle recognises that all States have both the sovereign right to exploit their domestic natural resources without ‘outside’ intervention *and* the responsibility to be ‘neighbourly’ by not abusing that right and engaging in activities that result in harm to areas beyond their jurisdiction (Shelton 2007).

Formal equality is an objective concept whereby the same unit of responsibility for costs (or the same right to be protected from costs) is distributed evenly amongst all stakeholders without discrimination (e.g., allocation per capita). Imposing equal units of responsibility onto equal subjects of law may be judged as just in some contexts, but it may not be socially just if the differences between these subjects are such that disparities in individual (dis) advantage are exacerbated. An equitable approach in such circumstances might entail “the appropriate treatment of unequals in view of the differences between them” (Bronfenbrenner 1973), and seek *substantive* equality between stakeholders through a range of mutually acceptable differentiating criteria.

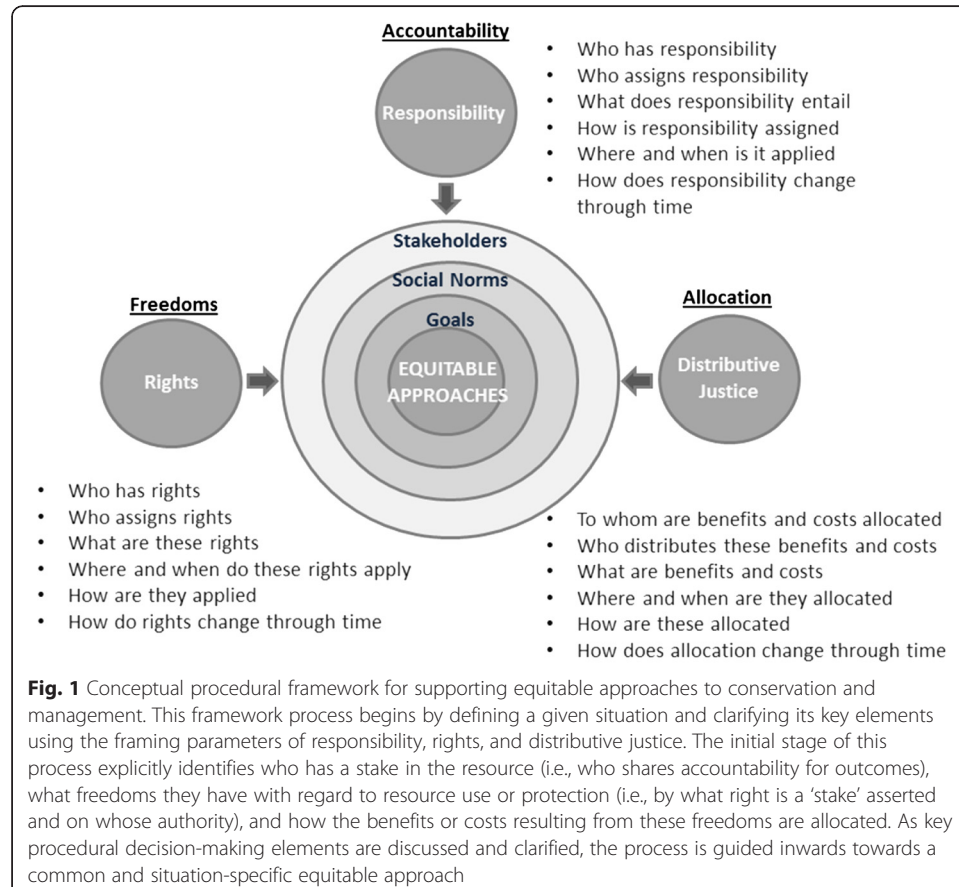
A number of criteria have been identified by scholars as justification for differential treatment in conservation cost and benefit allocation (Parson and Zeckhauser 1993); these include capacity, need, entitlement, power, strict equality, ‘greatest good’, and ‘just desserts’ (Deutsch 1975; Rose et al. 1998; Ringius et al. 2002; Shelton 2007; Soltau 2009; Dandy et al. 2014). More than one of these criteria may be relevant to a given conservation issue and inform the application of equity decision rules and management criteria. Need-based claims are a strong driver of distributive justice norms in international law and policy (Deutsch 1975; Rawls 1999; Ringius et al. 2002). These claims operate under the rationale that the use rights of some parties, or their right to be protected from certain burdensome costs, might ‘justly’ warrant prioritisation over those of others if doing so leads towards greater equality of opportunity among stakeholders. Need-based claims illustrate the conceptual difference between formal equality and equity in the just distribution of resource burdens and benefits. It is in trying to address these differences in a way that is seen as appropriate or ‘just’ to a given context that the procedural rules of distributional equity are developed.

Equity: parameters and process

The presence of equity language in decades of international environmental agreements and case law indicates that this multi-faceted concept plays an accepted, established and widespread role in addressing shared resource conservation and management challenges. From a governance perspective, therefore, the crux of the current debate in resource policy does not lie in the principle itself but in how it is applied. Resource stakeholder responsibilities, rights, and interests are complex, political, and often at odds with each other – finding equitable approaches in such a space is an understandable challenge. For example: who decides what ‘fair’ means in a given burden or benefit distribution context and with what criteria and authority? A more structured and consistent process that identifies the relevant parties and conservation goals, and then discusses the relevance and role of equity in resolving the issue at hand could

improve the transparency, accountability, and acceptance of resource policy processes and conservation outcomes. Thomas Franck was a proponent of this more procedural approach to conceptualising equity, concluding that equity “captures in one word a process of discourse, reasoning, and negotiation” (Franck 1995). Responsibility, rights, and distributive justice provide important structural underpinnings to any such process.

This ‘equity process’ could be integrated into regular policy negotiation processes. Requiring negotiating stakeholders to be accountable to basic procedural questions nested within the conceptual framing elements of responsibility, rights, and distributive justice could provide a more consistent and transparent means of scrutinising both individual and collective stakeholder contributions to common conservation goals (Fig. 1). Depending on the mechanisms and processes used to solicit the required inputs in context, the end result of this more structured process could help to clarify ‘true’ conservation barriers. This could mean that discrepancies between expected principle (i.e., what is laid out and agreed to in international agreements and customary law) and observed in practice (i.e., how States apply or avoid applying these principles in their own interest) become clearer or it could help reveal which ‘core subsystems’ are affecting each other vis à vis achieving individual versus common goals (i.e., see Ostrom 2009). Such a process could also inform the development of operational criteria for implementing equitable conservation and management schemes.



Equitable approaches in practice

With this conceptual framework in mind, the following section looks at two case studies that are illustrative of the current tools being applied to more equitably address transboundary conservation and management allocation challenges around the world. Both the Western and Central Pacific Fisheries Commission (WCPFC), established to improve the conservation and management of transboundary fish stocks, and the European Union Emissions Trading System (EU ETS), designed to improve global air quality, have resource conservation and management frameworks that incorporate relatively explicit distributional equity considerations into their operational objectives. This section provides an overview of the conservation issue and allocation challenge being addressed in each case study. It then provides an overview of the management tools and supporting policies that have been selected to address this challenge before focusing on how elements of responsibility, rights, and distributive justice have shaped the way equity was applied in the pursuit of conservation goals.

Regional oceanic fisheries: conservation requires compromise

In the marine environment, international transboundary fisheries resources are cooperatively managed through regional fisheries management organisations (RFMOs). The structure, scope, and mandate of these RFMOs are established 'by contract' through international treaties between States with a 'real interest' (i.e., a broadly interpretable and non-exclusive stake; see Molenaar 2000) in a region's transboundary fisheries resources. The United Nations Convention on the Law of the Sea (LOS) and the United Nations "Fish Stocks Agreement" (UNFSA) provide the overarching legal framework and basis for the establishment of RFMOs and their principles and standards for international fisheries governance (FAO 1999). No RFMO is exactly the same, but all are additionally supported by a host of treaties, conventions, and institutions that support regional cooperation among sovereign States while pursuing the 'higher goals' of fisheries governance espoused in international agreements.

At the most basic level, the right of State sovereign equality forms the basis of the principles and standards established for the conservation, management and exploitation of transboundary fisheries in RFMOs. This right, backed over time by principles of international law and case precedent, allows a State the exclusive right of privilege to undertake resource use activities in their own territory, to oblige other States not to infringe upon this right against their will, and to require other States to enter into contractual agreements to extend their rights into another State's territory. The articulation of these sovereignty principles to include natural resources occurred during a period of de-colonisation in the late 20th Century, when newly emergent developing States sought to re-assert control over their territory's natural resources (United Nations 1962; Schrijver 1997; Triggs 2006).

The Western and Central Pacific Fisheries Commission (WCPFC) is the RFMO responsible for the cooperative and sustainable management of transboundary fisheries resources in the Western and Central Pacific Ocean (WCPO). The WCPO is home to the world's richest and largest tuna fisheries, with a record value of approximately US\$7.2 billion reported for 2012 (FFA Database 2013). Unlike the high seas tuna fisheries in the marine 'commons' of other regions worldwide, the vast majority of WCPO

catches are harvested from waters under the sovereign jurisdiction of Pacific Island States, Indonesia and the Philippines (FFA Database 2013). In effect, the property rights over these transboundary tuna fisheries are predominantly shared between a small number of developing coastal States. These coastal States then charge access fees to foreign distant water fishing States (DWFNs) for the opportunity to harvest fish within their waters (Hanich et al. 2010).

Conservation is increasingly a matter of concern in the WCPO as some tuna fisheries are now threatened by overfishing and overcapacity (WCPFC 2013a). Given the transboundary and migratory nature of tuna, unrestrained exploitation in a particular national jurisdiction or on the high seas has the potential to significantly affect catches elsewhere. This has potentially devastating consequences for developing island States that are heavily dependent on the fisheries for revenue, development opportunities and food security (Hanich et al. 2010). Given these concerns, it is necessary that WCPO tuna fisheries are managed cooperatively throughout their range – both inside waters under national jurisdiction and beyond into the high seas (Langley et al. 2009).

The WCPFC was established by the Western and Central Pacific Fisheries Convention (hereafter WCPF Convention) upon its entry into force in 2004 (Western and Central Pacific Fisheries Commission 2000). The WCPFC is made up of over 40 coastal States and DWFNs as well as a coordinating Secretariat. This RFMO holds a series of scientific and technical meetings throughout the year to discuss different aspects of WCPO fisheries management, with a primary focus on tuna. These meetings culminate in a week-long annual regular session meeting where Members table, debate, and approve or reject by consensus a wide range of legally-binding high seas fisheries conservation and management measures (CMMs) for the coming few years.

The WCPF Convention builds on precedents in the LOSC, UNFSA and supplementary agreements and provides the WCPFC with some guidance on principles for ‘distributively just’ allocations of fishing rights and responsibilities among its members and ‘cooperative non-members’. Article 30 of the WCPF Convention, for example, repeats Article 30 of UNFSA and requires that the WCPFC and its members consider the special requirements of small island developing States (SIDS) when developing CMMs. Additionally, it prescribes that the global community interest in the conservation of fisheries should not result in a disproportionate burden of conservation action on developing States (Juda 1997). The WCPFC’s relative youth has allowed for the WCPF Convention to incorporate UNFSA language as well as ‘modern’ principles like ecosystem based management and participatory rights (Western and Central Pacific Fisheries Commission 2000). The incorporation of these principles along with the Convention’s framework basis for decision-making have helped identify the WCFC as one of the most successful RFMOs in terms of best practice (Cullis-Suzuki and Pauly 2010; Parris et al. 2010).

However, while the WCPF Convention and broader international fisheries law provide some guidance on how different aspects of WCPO fisheries management might be cooperatively and collectively considered, they are ambiguous in their guidance on the practical operationalization of equitable fishing rights and responsibilities (Parris et al. 2010). For example, there is no definition or clarity provided in the special needs provisions of Article 30 to identify what a proportionate (i.e., equitable) distribution of the conservation burden (or benefit) entails in practice. The distribution of a disproportionate burden of conservation has been a repeated point of conflict and has contributed to

compliance issues between SIDS and other WCPFC parties in the negotiation of new conservation and management measures (Parris et al. 2010; Hanich 2012; Miller et al. 2014).

Efforts to address this disproportionate burden have thus far relied on the application of numerous CMM exemption clauses. An exemption clause is a contractual agreement that specifies the limits to a party's liability. In the case of WCPFC tuna CMMs, the obligation to observe prescribed catch and effort restrictions (e.g., catch and capacity limits, seasonal and area closures, or limitations to setting on fish aggregating devices) applies to some States but not others. For example, all WCPFC States that fish bigeye tuna with longline gear have agreed annual catch limits; however, SIDS and members catching less than 2000 tonnes in 2004 are exempt from these limits (WCPFC 2013c).

Although these exemptions indicate a willingness among parties to consider and address differentiated resource use rights based on capacity and need, their application has thus far been at odds with both the best scientific advice provided for decision-making and the pursuit of tuna conservation (Parris et al. 2010; Miller et al. 2014). There is extensive literature on the development of international fisheries governance, the evolution of RFMOs, and their ongoing challenges to sustainably manage trans-boundary fisheries. For further reading, selected examples of include: Hey 1989; Kaye 2001; Henriksen et al. 2006; Lodge et al. 2007; Allen et al. 2010; Grafton et al. 2010; and Russell and Vanderzwaag 2010.

Given current levels of overfishing in the WCPO, the complexity of the region's fishing interests, the concentration of these interests in waters under sovereign jurisdiction, and the WCPFC's jurisdictional limits over these waters (Parris et al. 2010; Hanich 2012), a sustainable practical solution will require that some or all States agree to compromise some of their interests and carry some of the burden of conservation efforts for the ostensible collective gain. This raises important questions of distributive justice that are fundamental to conservation and management negotiations but are currently unanswered. Take, for example, a situation where one group of predominantly developed States will benefit from a conservation measure that will ultimately rebuild certain tuna stocks. Should those States bear a greater share of the conservation burden in comparison to other States who will also share some of the cost burden but receive little direct benefit? How should any compensation for imposed burdens be calculated, or applied?

In the absence of any framework to address such questions, negotiations have failed to successfully resolve the conflicting vested interests of WCPFC members. WCPFC members have supported the need for compromise and an equitable approach in the abstract, but have vigorously defended their vested individual interests in the heat of negotiations (Hanich 2012; Miller et al. 2014).

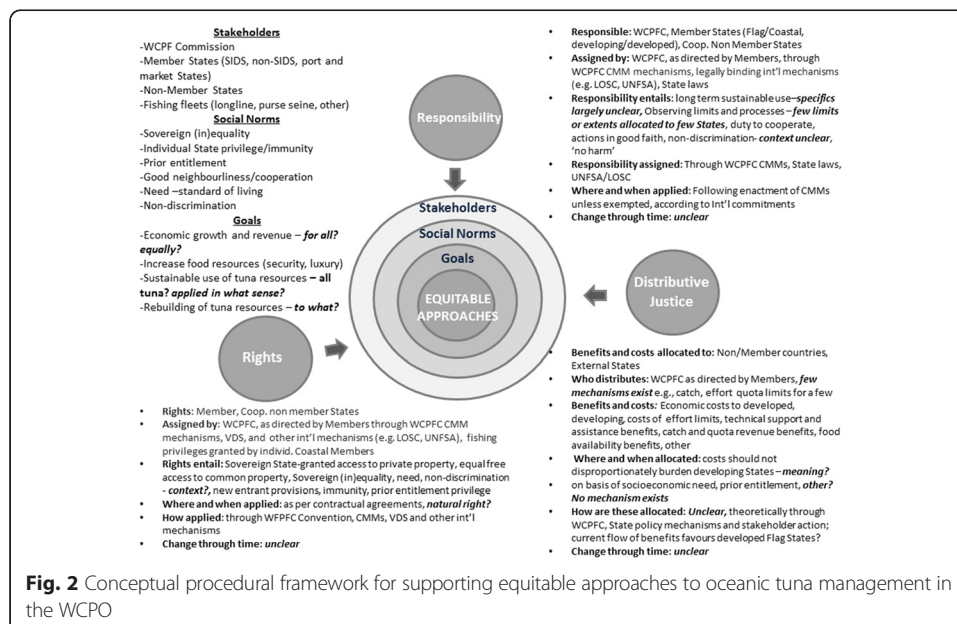
In December 2013, the WCPFC adopted CMM 2013–06, a *Conservation and Management Measure on the Criteria for the Consideration of Conservation and Management Proposals* (WCPFC 2013b). This new measure requires WCPFC members to apply specific questions to any conservation and management proposal to determine the nature and extent of its impact of on SIDS and Territories. Among other things, the WCPFC is now required to determine which States and Territories must actually take action to implement a proposal, and which States and Territories would be impacted by the proposal, in what way, and generally to what proportion. Critically, however, WCPFC members have yet to implement a successful a framework for then distributing any conservation burden beyond the broad principles articulated in Article 30.

In December 2014, the WCPFC once again discussed these concerns, but again failed to reach agreement at a meeting that was widely described as contentious and difficult (Norris 2014; PEW 2014; Undercurrent News 2014). Some attempts were made to propose potential processes but these did not receive sufficient support or clarity to then resolve key conservation and management stalemates (Western and Central Pacific Fisheries Commission WCPFC 2014a; WCPFC 2014b; WCPFC 2014c). The Pacific Islands Forum Fisheries Agency expanded upon their 2013 discussions, clarified potential processes, and noted the different forms of potential conservation burden that could occur, namely: 1) administrative burdens, whereby States may be required to absorb unreasonable costs in order to implement a measure; and 2) outcome burdens, whereby States lose revenue or other benefits as a result of a conservation and management measure (WCPFC 2014c). Ultimately, however, the WCPFC was unable to adopt the measures necessary to reduce fishing mortality for bigeye tuna to sustainable levels, due to a failure by members to reach agreement on measures that would avoid disproportionate burdens of conservation action falling on developing States.

While the WCPFC has made some progress towards identifying the tangible national impacts of regional tuna fishing with greater transparency, no criteria have as of yet been determined for assessing, or more equitably distributing, these impacts. To overcome this current political impasse, it is evident that further dialogue is needed to better define the responsibilities, rights, and distributive justice of burden and benefit allocation (Fig. 2).

International climate change, the EU emissions trading system, and the principle of common but differentiated responsibilities

In counterpoint to the above case study, the field of global atmospheric pollution abatement provides some of the longest-standing examples of how policymakers have sought to incorporate equitable approaches into applied transboundary conservation and management.



Research and development into equitable international emissions abatement policy arrangements was well underway prior to the existence of the 1997 Kyoto Protocol (e.g., UNAGBM 1995; Phylipsen et al. 1998). In 2005, following the policy and negotiation groundwork laid by the Kyoto Protocol and the applied successes of smaller domestic emissions trading schemes in the USA and Europe, the EU implemented the EU ETS to reduce its emissions of human-caused greenhouse gases (Ellerman and Buchner 2007; EC 2012).

The EU ETS is a decentralised and multilateral policy instrument of unprecedented size that includes 31 member countries, more than 11,000 individual sources of industrial pollution, and regulates 45 % of the EU's total emissions (in billions of tonnes) as of 2013 (Ellerman and Buchner 2007; EC 2012). While its emissions allocation processes remain far from perfect (Tonn 2003; Ellerman and Buchner 2007; EC 2013), it has been nevertheless pioneering in many of its efforts to equitably allocate the rights and responsibilities of international emissions burdens and benefits.

The EU ETS is representative of a market-based 'cap and trade' instrument endorsed by the widely-ratified United Nations Framework Convention on Climate Change (UNFCCC) (UNFCCC 1994). The relative popularity of an ETS as a conservation tool comes from its capacity to limit access to a common-property resource through the creation and allocation of private use rights, to shift the cost burden of pollution control efforts from the controlling authority to the polluter, and to reconcile seemingly incompatible economic growth and conservation objectives using a flexible and transparent market-based operating framework (Tietenberg 2006).

ETSs require significant negotiation and cooperation among participants in order to succeed in practice. While the argument could be made that this makes them cumbersome and slow, the same could be said for any process requiring international agreement to proceed. ETSs beneficially provide a framework and a platform to identify and discuss the role of equitable approaches to conservation outcomes. In a conventional cap-and-trade model framework, an overarching administrative body, generally agreed upon by scheme participants, is given the responsibility of setting a cap on existing emissions, establishing a trading market, and devising a set of regulatory and distributive rules for allocating emissions rights based on this cap (Tietenberg 2006; Rose and Wei 2008). These emissions rights are allocated among participants as quota over some designated time frame (Rose and Wei 2008). These quotas effectively represent the participants' agreed-upon 'rights' to pollute as well as delineate their individual responsibilities to observe a scheme's prescribed limits and processes so that participants act 'justly' in accordance with the collective desired pollution abatement outcome.

Scope and scale aside, the EU ETS distinguishes itself from other existing cap and trade systems in that it has yielded repeated, explicit, and consensus-driven agreement on EU-wide and State-level emissions abatement targets over a considerable period of time. Uniquely, this trading instrument is also supported by separate complementary international burden sharing arrangements. The Burden Sharing Agreement (BSA) for equitably fulfilling the EU-wide emissions cap (in effect between 2008 and 2012) and the Effort Sharing Decision (ESD) for equitably addressing additional state-level emitters (2013–2020) support the implementation of this tool alongside other supporting multi-lateral agreements (EC 2012).

Also unusual in an international setting is the fact that the EU ETS emissions allocation negotiations are all coordinated and enforced through a supervening international

authority – The European Commission (EC). While examples of similar international co-operative management organisations exist (e.g., River basin Commissions; regional fisheries management Organisations - see first case study), the regulatory authority of the EC is far more extensive and integrated with State governments; its enforcement capacity therefore remains effectively unmatched in practice.

The EU ETS and its complementary policy tools come out of more than a decade of international negotiation and discussion about how to appropriately address the reduction in atmospheric emissions necessary to combat human-induced global climate change (UNAGBM 1995; Phylipsen et al. 1998; Ringius et al. 2002; Ellerman and Buchner 2007; EC 2012). The ‘equitable approach’ that emerged from these extensive negotiations was the principle of *common but differentiated responsibilities* (Art. 3 (1), UNFCCC 1994). This overarching concept combines multiple equitable principles of rights and responsibility allocation; principles include formal and sovereign equality, good neighbourliness, capacity, and need.

The UNFCCC text provides no guidance on the operationalization of this concept other than developed countries “should take the lead” in combatting climate change and its adverse effects (Art. 3 (1), UNFCCC 1994). However, the multi-criteria spirit of *common but differentiated responsibility* is evident in some of the more distinctive characteristics of the EU emissions cap-and-trade process. Through the initial implementation of an EU-wide emissions cap, the EU ETS recognised that EU Member States have equal sovereign rights and responsibilities over their internal affairs while being simultaneously responsible as ‘good neighbours’ for collectively addressing the transboundary problem of atmospheric pollution. However, the application of differentiated caps also acknowledged the unequal capacities of countries to effectively meet both individual and Europe-wide air quality conservation targets (EC 2012). Capacity to contribute to emissions reduction was determined on the basis of each member States’ financial capacity or ‘ability-to-pay’ to meet required binding emissions abatement targets, or conversely, on its economic need to continue to emit for the betterment of its baseline standard of living. Emissions quotas were initially allocated freely on the basis of economic capacity and need and were measured in terms of a given EU State’s relative indicator of ‘wealth’ (i.e., GDP) in a baseline year. This differentiated burden allocation approach saw wealthy countries such as Denmark voluntarily ‘take the lead’ and commit to a 20 % reduction in emissions, while developing Bulgaria was permitted a 20 % increase in emissions (EC 2012).

Additional procedural equity provisions included in the EU ETS further distinguish it from other cap and trade models. These include ‘new entrant’ and closure provisions and the elimination of the precedent of merit-based *ex post* adjustments of emissions allowance allocations based on positive performance (Ellerman and Buchner 2007). Phase three of the scheme is phasing in auctioning as a means of allocating a percentage of emissions permits and of adjusting the distribution of profits derived from emissions trading (Ellerman and Buchner 2007; EC 2013).

Over time, the EU ETS has also distanced itself from customary sovereign rights-based distribution practices such as ‘benchmarking’. In context, benchmarking multiplies some index of historical activity or capacity by a uniform standard emissions rate to allocate emissions quota rights on the basis of ‘inherent’ State sovereignty and historical entitlement principles (Ellerman and Buchner 2007). Unlike a ‘use per capita’ or proportional allocation approach based on formal equality principles, international-scale historical

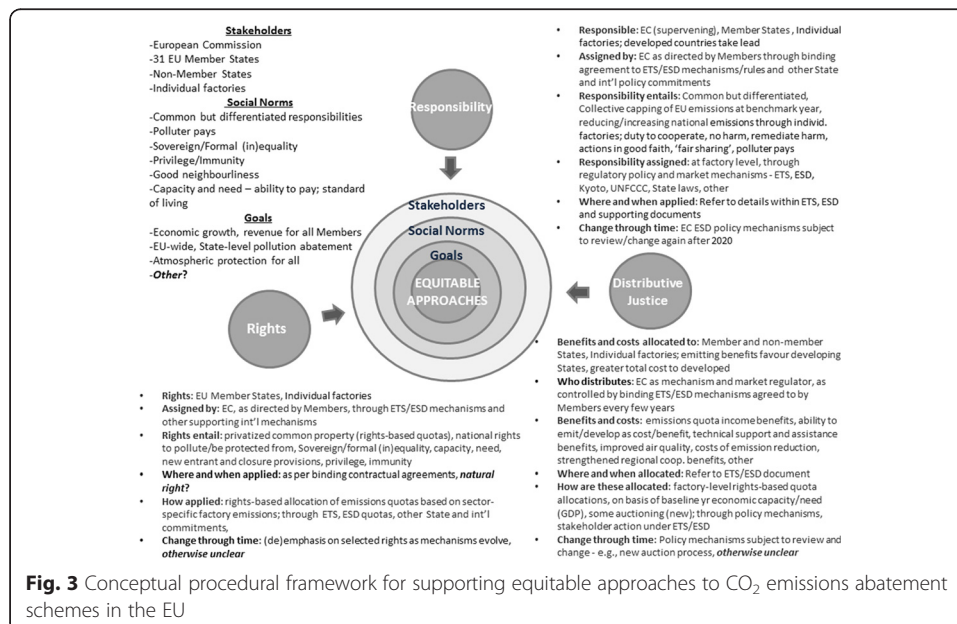
entitlement rights can favour older and more capacity-rich States in international negotiations by entrenching use rights for the heaviest long-term users or polluters (Tonn 2003; Vaillancourt and Waaub 2004; Shelton 2007). Instead, the EU ETS allocates allowances at the individual factory level based on each factory's respective contribution to emissions within their sector (Ellerman and Buchner 2007).

The effort to identify, discuss, and then apply equitable approaches in context are reflected in the relative completeness of the conceptual procedural framework (Fig. 3). This indicates that considerable critical dialogue has already taken place and that processes have been established to support equitable approaches to emissions abatement. Additional dialogue could however be directed towards how framework elements might change over time, what processes might also need to change in order to remain equitable, and whether the goals driving these equitable approaches are actually being met to satisfaction.

Despite the many distinct incorporations of equity into the EU ETS and its decades-long ability to sustain cooperative international discourse, this instrument's overall success at meeting overarching atmospheric conservation goals is the subject of debate and criticism. Key criticisms include a lack of ambition over overall abatement targets, poorly-executed initial permit allocations leading to poor market performance, overuse of exemptions, and system vulnerabilities to political interference (Tonn 2003; Ellerman and Buchner 2007; IPCC 2007). Concerns over the overall equitability of the EU ETS approach also remain. The USA and Canada, for example, remain resistant to the implementation of a more globalised emissions trading scheme, arguing that some countries will get off too easy while their own costs of abatement action will be too high (Bush 2001; Environment Canada 2011).

Lessons learned and implications for equitable approaches to transboundary marine fisheries management

The two case studies above are representative of a growing recognition that an appropriate treatment of equity is an essential part of overcoming the human barriers to effective



transboundary resource conservation and management in both terrestrial and marine environments (Rose et al. 1998; Shue 1999; Ringius et al. 2002; Tonn 2003; Hernes et al. 2005; Soltau 2009; Sommerville et al. 2010). In order to reach conservation goals, transboundary conservation schemes both within and between States must tackle a challenging combination of factors at different scales of governance, geography, and time. These factors include multiple jurisdictions, joint management, diverse interests, and asymmetric power, capacity, and need. The diverse rights and responsibilities of different stakeholders in context, as well as their different perspectives on what constitutes a just distribution of conservation benefits and burdens adds an additional layer of complexity to this challenge. This decision-making environment means that conservation solutions must necessarily be cooperative, consensus-driven, and as transparent as possible.

This analysis has chosen to explore how such challenges might be better addressed within the existing framework of international policy and law; however, alternative approaches, like the social justice-centric approaches of Hernes et al. (2005) and Bundy et al. (2008), are equally worth exploring. The key message in undertaking these analyses is that more innovative thinking is required to more successfully address the transboundary conservation challenges of the day, and that equitable approaches must play a role in this success.

Regional marine fisheries in the WCPO and atmospheric GHG emissions in the EU are physically different resources, with different geographies, stakeholders, and sub-national policy pathways for the implementation of compatible measures. Indeed, further critical analysis is needed to address the horizontal and vertical governance challenges of implementing more equitable approaches into compatible sovereign State measures. At the international level, however, many of the conservation challenges of these two resources, and the way decision-makers are trying to address these equitably through existing international law and policy frameworks, share some striking similarities.

Here, we address four of these similarities: 1) In both cases, there are overarching international legal agreements and precedents that can inform the general understanding and use of equitable concepts in transboundary conservation and management; 2) Both face challenges to the operationalization of these concepts due to insufficient guidance by these same agreements and precedents, as well as by the selected conservation tool; 3) Both rely on regional governance arrangements to coordinate the activities and actions of sovereign States and to provide a consensus-driven forum to address common goals and issues; 4) Both incorporate equitable principles into their different conservation schemes; despite this, both still face key difficulties in adequately addressing willingness and ability to pay for conservation.

With regard to the first similarity, applications of equitable concepts in international law have persisted for decades despite the strong debate over and lack of 'unifying' definition for equity. These precedents, such as the principles of good neighbourliness, sovereign equality, and ability-to-pay, as well as international legal precedents relating to watercourse use, fisheries jurisdiction, and maritime boundaries establish a template for equitable transboundary resource benefit distribution across diverse stakeholders and under a number of different scenarios.

However, as the second similarity indicates, there remains a critical divide between intent and outcome in these two different transboundary resources. This highlights a need for both resource use stakeholder groups to actively engage more meaningfully

with each other to clarify roles, responsibilities, and rights of conservation action in context. This engagement must also consider a mixed, multi-principled approach to equity that adequately accounts for differing perspectives on distributive justice. Cooperative development of consistent decision-making processes (e.g., such as Fig. 1) that identify the 'boundaries' of equity in a given context could help avoid the endorsement and application of inadequate or contradictory principles that lead to inequitable (or non-existent) conservation outcomes in practice.

The limited fisheries conservation outcomes in the WCPFC provide an example of what can happen when internationally-accepted equity principles are applied selectively to individual advantage and without adequate dialogue or process. Distant water fishing States continue to push for sovereignty-based allocations of harvest rights or vessel limits based on entitlement and historical activities. This occurs despite practical evidence that this approach functionally discriminates against the interests of the developing States that they are obliged to consider under international law (Hanich and Ota 2013).

In contrast, despite the clear difficulties the EU ETS has faced in effectively implementing the market-based component of its conservation scheme, its conservation burden sharing negotiations remain some of the most comprehensive and transparently inclusive of differentiated, 'unequal' participating stakeholders in international transboundary resources policy. These negotiations were framed in the spirit of *common but differentiated responsibilities*, which critically recognizes that capacity and need are major drivers of perceptions of 'fairness' over historical entitlement in this context, and that addressing these factors appropriately has played a key role in encouraging sustained, shared contributions to collective conservation outcomes. However, in operationalising the outcomes of this further dialogue and negotiation, it will also be important to consider how applied equity considerations might affect overarching conservation goals. For example, both conservation schemes currently use policy exemption clauses to address stakeholder capacity and need concerns. In the WCPFC, these exemptions are identified as a barrier to effective conservation because the exempted development actions of some States have not been compatible with conservation-driven caps on fleet capacity (Parris et al. 2010).

The third similarity notes the presence of regional governance arrangements to coordinate the activities and actions of sovereign States and to provide a consensus-driven forum to address common goals and issues. In addition to being supported by the diverse stakeholders themselves, equitable approaches to conservation also rely on a complex interaction of domestic and international support from institutional, political, and financial structures. An overarching mediating authority provides the 'common ground' and guidance necessary for addressing "institutional ambiguities" (van Tatenhove 2013) and what Wallace (2000) describes as a "swinging governance pendulum" of supra-national, intergovernmental, and national arenas. Regional arrangements also provide a platform to create regulatory policies that clarify the overarching rights and responsibilities of current participants as well as of potential future new entrants. It is worth considering if these particular schemes would have succeeded to the extent that they did without the support of such regional structures.

The fourth similarity between the WCPFC and EU ETS case studies is that an appropriate treatment of willingness and ability to pay remain a key stumbling block to the successful realisation of desired conservation outcomes. This is despite efforts to incorporate equitable approaches into both conservation scheme frameworks. The capacity and will of

stakeholders to act in a prescribed way for the common benefit while taking on individual costs is critical to the ultimate success of conservation schemes. In most cases, a developing country will simply not have the same capacity to pay for remediation, abatement, and compensation costs as a developed country regardless of its contribution to the problem or level of enthusiasm for a shared conservation goal. This issue of capacity is why developed States are given a more explicit responsibility to 'take the lead' in addressing shared conservation challenges in international law.

With regard to will, those being asked to take on the costs of conservation must have a sufficient ownership of the perceived problem in order for cooperative conservation schemes to attract the necessary support, or willingness-to-pay, for successful actions and outcomes (Spiteri and Nepal 2006; Wunder 2007). This ownership is linked to the effective establishment of rights, not just in the sense of physical property boundaries, but also in the deliberation of responsibility for burden and benefit distribution. If the push for action is not sufficiently demanded, developed, and endorsed by those potentially affected, then the very presence of some conservation schemes may be considered inequitable and yield outcomes with little net conservation benefit (Wunder 2006; Gross-Camp et al. 2012).

Moreover, if the benefits of conservation are expected to flow largely to one stakeholder group, then other stakeholders will have little willingness to carry a conservation burden. In this regard, the WCPFC tuna fisheries continue to struggle with achieving the necessary catch reductions in the face of divergent stakeholder interests and dramatically unequal benefit flows (Hanich 2012). WCPFC participants evidently do not have a uniform relationship with the given resource, and their willingness to act therefore differs according to their different opportunity costs. Issues of willingness-to-pay as a barrier to effective conservation outcomes have been explored at length in the terrestrial payment for ecosystem services (PES) literature (Spiteri and Nepal 2006; Wunder 2006, 2007; Börner et al. 2010; Gross-Camp et al. 2012).

Even when there is sufficient willingness to pay among stakeholders to drive conservation action, both the above case studies and examples in PES literature indicate that a successful transboundary conservation scheme should also be accompanied by appropriate institutional, regulatory, and financial support mechanisms (Börner et al. 2010; Clements et al. 2010). These support mechanisms contribute to the perceived value and equity of conservation service delivery (Spiteri and Nepal 2006). In this regard, voluntary and compensation-based conservation schemes have generally been viewed as more equitable at least in transboundary terrestrial conservation contexts (Wunder 2006).

This analysis of two case studies does not claim to represent the complete range of issues faced by transboundary resource managers. However, their similarities indicate that they are representative of many of these issues; as a result they yield some broadly relevant insights to transboundary resource conservation in general. With regards to transboundary marine fisheries, however, what are some of the relevant takeaway lessons to help inform more effective and equitable conservation policies?

First, if the complexity of equity issues in both case studies is indicative of transboundary conservation issues more generally, the successful conservation and management of highly migratory and shared transboundary fish stocks will require a mixed but coordinated approach to operationalising equity more broadly into practice. This mixed approach will likely need to include a combination of binding and voluntary management measures to

account for State sovereignty rights while encouraging “willingness-to-pay” compliance. Such approaches will first need to engage more strongly and transparently in marine policy discussions that clarify the rights and responsibilities of unequal stakeholders in a “common but differentiated” way. These conversations have begun in the WCPFC in their implementation of WCPFC 2013–06 and exemption clauses, but the first is incomplete, and the second as currently applied is arguably undermining overarching conservation goals. The WCPFC, as well as other RFMOs, may wish to consider how creating a separate burden sharing arrangement process, such as was undertaken for the EU ETS, might be helpful in separating out some of the technical conservation decisions from the political ones.

Second, regional institutions like the EC and RFMOs (and others like transboundary river basin authorities) provide an arguably indispensable common platform for more integrated ‘common ground’ in a complex legal and governance environment. Regional institutions not only provide the framework for transparent supervening guidance in a complex and dynamic decision-making environment, they are also capable of pooling together stakeholder competencies and decision-making processes in an otherwise fragmented international policy arena (van Tatenhove 2013). While RFMOs have received criticism for their lack of effectiveness in delivering on overarching conservation goals (Cullis-Suzuki and Pauly 2010), it is worth speculating how far international transboundary fisheries management and conservation would get without these institutions.

The reality of managing transboundary fisheries, or any transboundary resource for that matter, is that difficult and contentious decisions will need to be made by those tasked with the responsibility of conservation decision-making. Effective conservation actions imply trade-offs, with greater costs borne by current generations for the potential benefit of future ones. Conflicts over shared resource use and barriers to conservation are likely to persist without greater collective efforts to define, and then respond to, the key elements of responsibility, rights, and distributive justice that successfully drive equitable conservation and management in both terrestrial and marine environments. This paper illustrates that even without a concise definition of equity, the precedents and tools already exist to generate more equitable solutions to shared resource use problems. Developing and negotiating the necessary refinements for greater success in transboundary fisheries management is indeed well within our collective capacity.

Competing interests

The authors declare that they have no competing interests.

Authors’ contributions

BC carried out the analysis of general principles and the case study relating climate change. QH carried out the analysis relating to migratory fisheries. Both BC and QH collaborated to develop the discussion and conclusion, and collaborated to write the paper. Both authors read and approved the final manuscript.

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