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Reformulating 'Holism' in hydropower decision-making

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Abstract

This paper investigates the necessary-impossible paradox facing hydropower decision-makers of the Mekong River Commission: that aspiring towards a holistic risk assessment is both socially useful and necessary, but also meaningless and impossible (because the future remains unknown). The thesis here is that to come to terms with this paradox, a Luhmannian inspired relational model offers superior analytical tools compared with an Aristotelian essentialist approach. This is because where the latter typically employs integrative approaches which attempt to show why through rational reasoning risk assessments are holistic, the former takes into account that holistic risk assessments are contingent on the observer, on an organisation's position within a network, and on the 'temporal atoms' that mark the 'time' of social systems. By employing a relational framework comprised of *variation*, *selection* and *retention* to capture this comparative sociology of the observer, the contribution here offers a radical reformulation of holism in hydropower decision-making.

1 On the tradition of holism

Holism puts the study of wholes before that of the parts. It derives from the Aristotelian mindset which sets out to bring together disparate elements into a more integrated whole. The reasoning here is just like parts of a body only make sense in terms of the way they function to support a whole organism, so too should reductionist approaches favour the higher holistic goals of commonly shared values, rational argumentation, or coordinated action (Habermas, 1984). Today, this Aristotelian mindset prevails in dam-development 'Downstream Response to Imposed Flow Transition' – an impact risk assessment employed in semi-arid regions, where water-supply problems are pressing and uncertainties about river-linked side-effects high (McManamay & Bevelhimer, 2013). Accordingly, the mindset here is that to holistically assess the quantity, timing, and quality of water flows required to sustain riverine ecosystems, and the human livelihoods that depend on them, two key elements are essential: i) that the whole river ecosystem, including all major abiotic and biotic components be accounted for; ii) that a structured approach which combines data and knowledge from all disciplines be employed to produce flow-related scenarios for water managers to consider.

At a first glance, this Aristotelian Downstream Response to Imposed Flow Transition (DRIFT) approach might seem like an innovative way forward, as promoted by the river basin organisation, the Mekong River Commission (MRC) which coordinates with the governments of Cambodia, Lao PDR, Thailand and Vietnam to provide holistic hydropower scenario-planning on the Mekong River (Dore, Lebel, & Molle, 2012). Typically, these scenarios are justified by 'predict-and-choose paradigms' (Islam & Susskind, 2012); for example, that because the release of large

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amounts of water from hydropower dam X is predicted to scour/not scour the river bed's sediment, we recommend policy agenda A. Of course, there is no denial that such DRIFT results and subsequent policy recommendations are necessary for informing decision-making. Yet at the same time, this emphasis that justification can ultimately be sought only in the predicted results of DRIFT, also leads back to a paradox that the impossible is postulated as necessary. Why? It is because the impossibility problem of full prediction will always re-enter decision-makers in the questions of: Who can say with certainty whether the 'consequences' that are not directly produced by DRIFT results will actually follow? Who can rule out the possibility that unforeseen consequences may in fact change the results of DRIFT? And who can guarantee that the DRIFT results themselves are legitimate DRIFT results?

This brings us to the research problem of the paper: if it is true that aspiring towards a holistic DRIFT is both necessary but also impossible (because the future remains uncertain), how then might hydropower decision-makers fully embrace and openly exhibit this paradox? Under these circumstances, perhaps what we need is neither blind faith in the necessity of 'full prediction', nor a more trenchant critque of the impossible advocating for 'no prediction', nor content with a 'somewhere between' approach (Allen, 2000) - that would be merely an easy way out of the necessary/impossible paradox. Rather, what we need most is a new guideline or framework which takes into account that a holistic DRIFT is contingent on the observer, on an organisation's position within a network, and to the 'temporal atoms' that mark the 'time' horizons of social systems (Rabinow, 2008). Drawing upon the works of Niklas Luhmann, this, I propose, is best theoretically captured by employing a relational framework comprised of *Variation*, *Selection* and *Retention*: namely, how *variations* set in when *selection* and *retention* take place. In the context of the MRC's DRIFT scenario planning which this paper will employ to illustrate the nuances of hydropower decision-making, this can be summarised as follows: that variable DRIFT results set in, when the selection is made by the MRC to implement hydropower scenario planning and retain legitimacy in decision-making.

In what follows, I will first provide a brief summary of how a relational methodology, or 'comparative sociology of the observer' (Fuchs, 2009), can help flesh out some of the problematic implications of the Aristotelian inspired DRIFT approach (section 2). I will then explain how a relational methodology radically reformulates the notion of holism (section 3), followed by the main body which aims to improve the conceptualisation of holism, wherein I employ the MRC's DRIFT as the contextual background to illustrate the intricacies of hydropower decision-making (section 4). Finally, reflections on the problem of holism are reached in the last section.

2 Fleshing out the problematic implications of holism

To this present day, a threefold concept of 'integrated management' remains highly influential in the Aristotelian inspired DRIFT approach: that integration equates a unified whole equalling the total sum of its parts, and that by making use of human rationality the assessment of DRIFT can be steered in the direction towards holism. This section shares none of these suppositions and will instead flesh out some of the problematic implications of this Aristotelian mindset.

At a first glance, a relational methodology appears to share many commonalities with post-modernist critque: that modern society simply imbues too little visible harmony for such Aristotelian dictum of a whole composed of parts. This is not

difficult to see given that the ‘water-food-energy’ nexus intermesh with each other in so many different ways that there is simply no collective adding up of perspectives, but rather a differentiation into singular horizons, as reflected in several recent critiques of integrated water management (Lejano, Ingram, & Ingram, 2013; Saravanan, McDonald, & Mollinga, 2009). However, where relational methodology and post-modernist critique diverge is where the approach denies the concept of a general (human) rationality. This is because from a relational perspective, the rationale that it is enough to use one's own reason in order to find the true state of reality, is wholly inadequate to the complexity of modern society. Instead, accordingly here, rationality is best conceptualised as the construction of a social (communication) system (Moeller, 2012).

Of course, this conceptual stance is not to deny that people cannot think and implement actions themselves, but what is suggested is that people are no longer entirely in charge. A scientist eager to provide a ‘holistic’ DRIFT may employ multivariate models to predict fish richness or riparian vegetation responses to changes in river flows (McManamay & Bevelhimer, 2013). But in order for DRIFT results to be of significance and meaningful relevance, policy-makers must also employ a parallel assessment of the social side-effects which may occur under various differentiated flow regimes. Hence, the rationale of the policy-maker is dependent not only on scientific findings, but moreover, on the self-enhancing, self-maintenance of other social (communication) systems, such as the economy, politics, mass-media and so forth. In short, the point here is not to merely reiterate an Aristotelian plea for ‘interdisciplinarity’, but rather it is to suggest a far more disturbing observation: that it is primarily social communication systems, not people, which actually stimulate and perpetuate the processes of societal rationalization.

If one accepts this sociological insight, then this has dramatic consequences for narratives which assume that integrative approaches can steer DRIFT results in the direction towards holism. For the issue here is that in a hyper complex society where different social systems employ different ‘unrankable’ (Roth, 2017) versions of rationality (scientific justice, economic justice, juridical justice), this disturbingly means there can be no natural equilibrium and no unilateral control of any one system over another. This does not imply each social system does not wish to be heard by other systems. But what is implied is that each social system can only ever talk to itself about other systems, as exemplified when the systemic rule of rationality determines that all scientific observations of DRIFT takes place first on scientific terms, and re-contextualised from an economic or legal point of view only second. This is not necessarily a bad thing of course, but what is suggested is that social systems have an innate tendency to talk past each other, just like ships passing each other in the dead of night, which raises the question to be explored next: how can analysis rediscover and reconceptualise holism, and how to do this without bemoaning the loss of holism?

3 Reformulating the notion of holism

Relationalism offers a counter-intuitive methodology for reformulating holism. This is because from the perspective of relationalism, the traditional notion of integration, the bringing together of disparate elements into a more holistic whole serves only to emphasize the ‘realness’ of social aspirations (Luhmann, 2018), rather than as concrete blueprints for action. Hence, this explains why DRIFT results which describe

themselves as ‘holistic’ are frequently impaired whenever the criticisms of capitalist hijacking (Molle, 2008), or scientific complexity (Salzman & Thompson, 2007) are directed at them. Of course, this is not to say that aspiring towards a holistic DRIFT is a meaningless endeavour. But what is suggested is that before jumping ahead to the question of ‘What DRIFT results are accurate?’, a vital preliminary question first needs to be grappled with, ‘How can one observe and describe adequately the decision-making processes of DRIFT’? The relational answer: by denuding the social from facile impressions of progress, which in the context of DRIFT discourses, is best acquired by conceptualising integration not as a process better or more holistic than disintegration, but as the interrelations between social systems (Borch, 2011). Indeed, this we may call a relational non-essentialist reformulation of integrated holism.

It is important to realise that ‘interrelations’ refers here not to an easy-to-grasp reality of inter-systemic connections. On the contrary, it refers to a paradoxical re-assertion of the cognitive separation of systems. This is best conceptually captured in the schema of system-environment differentiation, which from a relational perspective offers a more accurate understanding of homogeneity compared to the traditional Aristolean parts-whole model. To briefly summarise, this schema postulates that a system (such as an organisation) is necessarily less complex than its social environment, because, to operate efficiently, a system can only select a limited amount of all the information that is available outside its boundaries (Luhmann, 1995). In other words, it is only through the reduction of a systems environmental complexity can the conditions for systemic interrelations be built (Valentinov, 2014), as Luhmann scientifically sums up, ‘reduction is a necessary condition for the ability to resonate; reduction of complexity is a necessary condition for building complexity’ (Luhmann, 2004).

The difference between Aristotelian philosophy and system-environment differentiation can be summarised in the table below:

	Aristotelian Philosophy	**System - Environment Differentiation**
Relation between Parts and Whole	The whole is greater than the sum of parts	The whole is less than the sum of its parts
Focus of Method	Essentialism (contingency to necessity)	Relationalism (necessity to contingency)
Focus of the Observer	Prescription (What are accurate holistic DRIFT results?)	Description (How can one observe and describe adequately the decision-making processes of DRIFT)

To illuminate the analytical power of a system-environment reformulation of an integrated holistic DRIFT, this paper proposes a Luhmannian inspired relational framework comprised of *variation*, *selection* and *retention* (Luhmann, 2012). What is

innovative here is how the framework rectifies the original intentions of holism not by merging disciplines or disparate elements, but by releasing the possibilities of self-observing a DRIFT, by freeing the analysis from the conventional limits of disciplines such as science, economics, politics or law. Admittedly, this does not mean the proposed relational framework is more privileged relative to Aristotelian inspired DRIFT approaches, but what is acknowledged, is that the framework rest on a different kind of blind spot. This being namely the conceptual stance to focus analysis on the level of the MRC's organisational chain of decision-making processes (of one decision generating endless DRIFT decision-making), as opposed to second-guessing the 'minds' of individual scientists or politicians participating in DRIFT. Hence, the blind spot here resides as the analysis observes from within the MRC's DRIFT decision-making machinery, a bit like the Walt Disney 3D animation 'Inside Out': the analysis gazes out onto individuals who, from this observational level, are perceived as alien bodies along with everything else (including natural features such as rivers). This may not sound very nice. But what this indifference towards individuals and natural features does do is paradoxically take them more seriously: it acknowledges that these alien bodies remain excluded from society and hence are marginalised, and that the only way they can become relevant is if they are incorporated into social communication. Indeed, to the research problem of *how to come terms with the MRC's necessary to holistically proceed/impossible to achieve DRIFT paradox*, this is best captured by employing a relational framework which precisely captures the complexities of social communication, as shown below:

> *Variation* captures the repertoire of possibilities afforded by social systems, when the selection is made by the MRC to implement DRIFT scenario planning and retain legitimacy in decision-making.
>
> *Selection* captures how the MRC's DRIFT (in)decision processes routinely emerges from the conflicting requirements of different social systems.
>
> *Retention* captures the MRC's ability to register and process the variable conditions which may interrupt the link between variation and selection, between DRIFT forecastability and organisational rationality.

Admittedly, this does not mean the relational framework will automatically win that race to improve the conceptualisation of the MRC's DRIFT. After all, the world will always be more complex than any given conceptual system. Nonetheless, what the relational framework can do is enable one to catch up, at least for a little while – and this is useful for helping us understand how the MRC's DRIFT may find a way into the 'futurity' of society, to get to grips with the range of possible meanings attached to DRIFT results by a multiplicity of highly differentiated observing systems.

4 Improving the conceptualisation of holism

4.1 Variation

Variation captures the MRC's accommodation of possible DRIFT results. It represents the surprise factor and the potential production of system intelligence. Variation, however, is never completely open. What can be detected and processed as possible DRIFT results at any time, depends upon the MRC's stream of accompanying

redundancies, which in this context, is the selection by the MRC to implement hydropower scenario planning and retain legitimacy in decision-making. But how then does hydropower planning limit the possible structural variation of an MRC's DRIFT results?

Consider the manner in which hydropower infrastructure 'technicalises' the MRC's DRIFT through the medium of the code work/fails, and its derivatives such as controllable water flows/uncontrollable water flows. What one finds is that the risk of a sudden uncontrolled water release will not directly change the MRC's DRIFT results, but rather the organisation will change itself, as afforded by, elicited from or ascribed by the dynamics of social systems. On the one hand, this is because each social system produces an intense *sensibility to specific questions*, (i.e. an attribution rule which falls within its specialised focus). For example, the science system reconstructs the risk of a sudden uncontrolled water release according to the severity of ecological damage calculated from hydrological models based on the watershed, aquifer, or river (sub)basin. The economic system reconstructs the risk according to the 'least-cost expansion planning' (Lahmeyer International, 2004) of whether financial systems can endure the possibility of a stock market crash which could render investments in the infrastructure development worthless. The political system reconstructs the risk according to whether the deployment of state authorities such as the police, or where necessary, the military are able to maintain and restore public order. And the legal system reconstructs the risk according to whether the employed institutional framework is adequate to deal with legal liability issues, such as monetary compensation for the loss of human life, ecological habitat, or investment property.

On the other hand, these differentiated criteria of success and relevance arise also because each social system simultaneously develops a great *indifference towards everything else*, including the operational logics of other systems. For example, in order for science to remain distinct from its environment and thus continue its quest for greater understanding of the relationship between hydrological and ecological systems (Richey et al., 2000),[1] it must develop indifference towards other operational logics, such as the monetary benefits gained from DRIFT results appeasing the interest of developers. Similarly, when investment risk assessments of a hydropower dam are devised, it is reasonable to suppose that the financial system will remain indifferent towards all those values that do not translate into the language of prices, such as the informal economy of 'untaxable' fisheries which do not contribute directly to government income (Barlow, 2016). Likewise, when the risk of ecological damage to wild-capture fisheries is calculated, the political system cannot always rely on scientific truths to help out, because these truths must also be supportable politically, and in line with the policy agenda of prioritising electricity generation to power development. Lastly, when one claims that the 1995 Mekong Agreement is ecologically unethical, this cannot be assumed to be unlawful, for the legal system must remain limited to the rules of the treaty instruments which set them up, whereby it is the conduct of state practice, not actual factual harm, which the law can understand and consider as lawful or unlawful (Kang, 2018a, 2019).

If it is true then that in modern society social systems are becoming more independent from each other, and thus increasingly able to follow their own logic, then this description helps to explain how variation is offered to the MRC's DRIFT. It explains how the *selective indifference* of social systems - the internal construction of

[1] For example, between how hydrological flooding affects riparian fishing productivity.

simpler model worlds - enables an unburdening of each social system from the need to have to reconstruct the world in each aspect. It explains why this prior reduction of complexity produces in turn a new found internal complexity within each social system, making possible the great achievements of science, economics, politics, and the law. And it explains why this increased internal complexity, clears the way for a hand in hand overall increase in the number of variant DRIFT possibilities, as each social system enables the other by introducing their own functional specialisation into each other (Djanibekov, Van Assche, & Valentinov, 2016). For example, the politically acceptable threshold level of a hydropower dam water release for irrigation purposes in the Lower Mekong region, will reappear as a factor that reduces or increases profits in the economic world of energy supply distribution, while the language of profit derived from income revenue of this energy supply, will reappear in the world of politicians as a limitation on how far promises can be made to guarantee a river's right to 'natural' flow (Kang, 2019). Similarly, the 'cumulative impact assessment' (Keskinen & Kummu, 2010) of the scientist will reappear as a factor that increases or reduces the standard protection level of the law, while the legal framework, such as the Dutch Delta Act plan reappears in the world of the Mekong scientist as the policy code for land use risk-management. In short, due to this process whereby social systems feed into each other and adjust to each other in order to maintain their 'andness' (i.e. 'holistic outlook'), this above all explains how DRIFT results acquire meaning and significance within society. But what mechanisms are available to ensure that such variation of constraints remains visible, despite the innate tendency for alternatives to disappear into the unseen (i.e. the principle of selective indifference)? The answer can be found in the systemisation of selections set in motion by the decision-making processes of the MRC, as will be explored next.

4.2 Selection

Selection captures how the MRC's DRIFT (in)decision processes routinely emerges from the conflicting requirements of different social systems. This does not mean social systems themselves determine DRIFT results, but what they do enable is a framework that offers the MRC a selection of constraints as designated by the principle of variation. For example, when implementing DRIFT scenario planning along the transboundary Mekong River, the MRC will usually have to link up to at least four social systems. It must be able to communicate economically (e.g. the monetary gains or losses of any goods that a river provides), politically (e.g. interpreting what might be politically opportune in the future), scientifically (e.g. calculating the severity rating of minimal in-stream river flow) and legally (e.g. ensuring that DRIFT procedures do not breach international law). In practice, this means that it is no longer possible to perceive the MRC's DRIFT results as a singular unit. Instead, all perfection of unity must be abandoned because the DRIFT itself becomes differentiated into a realm of sub- and alternative systems. Every link to a social system will re-establish the boundaries between what the MRC's DRIFT selects as its redundancies (results), and what it excludes and observes as all other systemic communications. And every increase in systemic variation will steer the MRC's DRIFT towards the direction that it comes to represent flexibility and randomness.

This description of a 'heterophonic' (Andersen, 2003a) decision-making process permanently oscillating between a range of rationalities and languages, offers both innovative ontological and epistemological insights. On the one hand,

ontologically, these functional insights provide the MRC a powerful conceptual grid to diagnose for whom the results of DRIFT are articulated as relevant or irrelevant for. The operators of the Yali Falls dam in Vietnam, for instance, might present its DRIFT benchmark as focused on assessing the dam's environmental impact. It might claim that the DRIFT's primary concern is to employ the logics of science and its formulas of risk minimisation. But in practice, empirical observation might diagnose that the DRIFT undermines the science system by evolving in such a way that the DRIFT results revolve around the economic interests of site suitability and electricity generation potential. As exemplified when the operators of the Yali Falls dam adopted a narrow definition of the project impact area, namely the national borders which may be acceptable from a political perspective, but are rejected as an absolute failure in terms of scientific basin wide planning, which includes taking into account of the transboundary impacts to neighbouring Cambodia (Wyatt & Baird, 2007).

On the other hand, epistemologically, these conceptual insights also highlight how the MRC's DRIFT is essentially grounded in a decision-making paradox of undecidability. In contrast to an ordinary communication which only communicates a specific DRIFT result (e.g. the impact on fish migration from the Don Sahong dam in Laos is less than significant), the paradox of undecidability communicates also - explicitly or implicitly - that there are alternative results that could have been selected (e.g. the harmful impact on fish migration from the Thakho dam is less than the Don Sahong dam). Indeed, only a DRIFT diagnosis that is in principle undecidable, that is, if the rejected alternatives are also communicated can a decision about the results be communicated as a decision (Luhmann, 2000). If a DRIFT diagnosis is reached that can only be answered in one way (e.g. why is the Don Sahong dam beneficial?), it lacks the property of ‘undecidability’ (Andersen, 2003b) and therefore denies the MRC's DRIFT the ability to simultaneously potentialise alternatives. These so called ‘one way’ rational DRIFT results are therefore not rational results at all, and this is why one speaks of the loss of trust in the establishment, such as when the Thakho dam disappeared as an alternative to the Don Sahong dam (Campbell, Suhardiman, Giordano, & McCornick, 2015). By contrast, the co-ordination of DRIFT would require analysis to observe not only what the MRC selects as its DRIFT results, but also the manner in which the MRC proceeds to limit its number of alternative DRIFT results. More specifically, this being the problem of how might the MRC's DRIFT handle the paradox between *invisibilising* the undecidability of decisions, so as to maintain certainty, and *visibilising* the alternativity of decisions, so as to maintain legitimacy? The answer can be found by exploring the manner to which the MRC's DRIFT retains itself, as will be explored next.

4.3 Retention

Retention captures the MRC's ability to register and process the variable conditions which may interrupt the link between the decision-making paradox of selection and variation, between organisational rationality and DRIFT forecastability. On the one hand, this is because the more the MRC selects its alternative DRIFT results as being justified (e.g. the single dam's severity rating is low when cumulative dams are not considered), the less the other options will appear as alternative results, and thus the less the decision will appear as rationally ‘decided’. On the other hand, the more the MRC communicates that there are real alternative DRIFT results to the one that has been selected (e.g. when cumulative dams are considered, the severity results are A,

B or C) the less the selected alternative will appear as justified and thus the less the decision will be accepted as 'decided'.

Of interest here is the question of how the MRC's DRIFT proceeds to invisibilise this paradox in order to retain legitimacy in decision-making. If one observes how the MRC constructs causality so as to justify a course of DRIFT results and subsequent recommendations, what one finds is the employment of a typical policy churning formula: because of X being identified as wrong as supported by DRIFT results Y, the MRC should implement solution Z in order to resolve problem X. Here where X is selected it is usually the 'present future' (Luhmann, 1976), that is, the present observation of potential futures.[2]As exemplified when the MRC employs a 'strategic environmental assessment' (Keskinen & Kummu, 2010) and observes that the present forecast of Northern Thailand will continue to be a poor and parched inhospitable place, and therefore because the Mekong river has 'significant tolerance' for development (WB and ADB, 2006), more hydropower dams should be built in order to reduce poverty and meet increasing energy and irrigation demands.

Indeed, there is no denying that satisfying future needs must be treated as a present problem. After all, under the conditions of the 'water-food-energy' nexus, dealing with these issues today can help mitigate problems in the future. But when one considers the future from the perspective of the present, there is always the high probability that contradictions will be multiplied. They visibilise namely in the form of whose guesses about the future are valid, which is the question of who is in power (Kang, 2019). What is to be done then if the proposed solution is politically convenient and acceptable to one social system, but leads to a potential functional disturbance in other social systems? What if the development of mainstream hydropower dams eliminates energy supply scarcity in Lao's, but simultaneously increases fish mortality and food insecurity for other local indigenous communities? Due to the successful 'invisibilisation of social inequalities' (Philippopoulos-Mihalopoulos & Webb, 2015), as promised by the political and economic success stories of 'environmental sustainable growth', such decisions may not produce noise (Kang, 2018b). Yet if this promise is broken and the cumulative effects of social exclusion produce disorder and 'absolute uncertainty', then whatever ways the MRC's DRIFT establishes to manage this crisis, it may not achieve more unless it first reckons itself with the vast horizon of temporal differences – that is, to extrapolate its present futures with the 'future presents' (Luhmann, 1976).

The future present is what the MRC's DRIFT cannot control because it is not yet determined. That said, a future present provokes reflection onto a range of things that are sayable, thinkable, and knowable within other systems in its environment. It looks forward towards the future and from the future observes how the temporal patterns of systems both enables and constrains the MRC's DRIFT. For example, there are always a range of possible arguments in: *financial markets*, where the threat to scenic or cultural heritage sites are mitigated by money, since there is always the possibility that a historical relic, such as the $ 2.5 million auctioning of the Han Dynasty Tomb in New York sky-rocketing (Alberts, Alberts, Bloom, LaFlamme, & Teerikangas, 2004), within a matter of seconds, the market value of a particular development site; *political interventions*, whereby the themes of river activist - 'no dam building on the Mekong', 'no blowing up of the river basin rapids' - are constructed in a circular

[2] From a relational perspective, the reason why an organisational system will tend to prioritise 'present future' observations, is because when its own selection history comes into play, the system 'acquires an environment in which much is possible but only a little is relevant' (Luhmann, 1995, 132).

relationship with the mass media and the political electoral cycles held usually every four to five years (Perlaz, 2005); *scientific findings*, whereby the notion of 'ameliorating' the migratory impact of dams depends not on producing objective truths about the success stories of fish lifts, as these must first be evaluated positively against existing scientific publications, and hence by the system which may take decades to verify (Sverdup-Jensen, 2002); *or binding legal norms,* whereby the validity of damming the Xe Kong River for electric generation usually depends on the agreed established rules of the Power Purchase Agreement between Laos and Thailand – until something unexpected occurs, such as the collapse of the Xe-Pian Xe-Namnoy hydropower project, and the effect this has of cutting loose the law from its 'social moorings' (Kang, 2019). In short, where the present future seems to lead to mono-contextual descriptions that offer considerable potential for contradiction, the future present leads to poly-contextual descriptions that instead serve to reduce the severity of the necessary-impossible DRIFT paradox. This is because, above all, the future present motivates goal-directed planning, namely, it offers the MRC's DRIFT an arrangement of differentiated temporal horizons with which to observe problems and changes more specifically, and thus increase the 'recognition of possibilities that hitherto have remained unrecognized' (King & Thornhill, 2003).

Of course, visibilising the alternativity of DRIFT results will inevitably increase the likelihood that selected results will become even less clear cut. They may even visibilise the 'emergency imaginaries' (Opitz & Tellmann, 2015) of the 'co-evolution of unsustainability' (Kang, 2018b) and subsequently perturbate 'degrowth' policies (Plaza-Úbeda, Pérez-Valls, Céspedes-Lorente, & Payán-Sánchez, 2019). Yet this permanent oscillation between present futures and future presents, the invisibility and visibility of alternative results, or selection and variation, is in fact necessary for the MRC's DRIFT retention. It enables the MRC to maintain the impression that a holistic DRIFT has been fulfilled and therefore 'business as usual' is legitimate. It creates a higher degree of freedom for the MRC's DRIFT, since differentiated functional time frames also work as a constraint on the MRC's selections, thus consolidating the expectations of DRIFT. Finally, above all, it obliges the MRC to learn to take into account how its DRIFT results affect other systems in its environment, and how this might feed back onto the MRC's decision-making process itself. Although the undecidability paradox will remain irresolvable because of the very disorganisation of the MRC's social environment, this does not imply that one has to lose heart and surrender to an 'anything goes' (Luhmann, 2000). The question is only how might the MRC's DRIFT results develop cognitive strategies which can endure the irreducible complexity of the world and the selective indifference peculiar to all social systems, and to allow these operations to become productive? The answer, nevertheless, can only be answered by systems because with different social systems there comes different temporal time frames which reconstruct the reality of the world (and hence reduce complexity) in functionally differentiated ways.

5 Reflecting on the problem of holism

This paper investigates the necessary-impossible paradox facing MRC hydropower decision-makers: that aspiring towards a holistic DRIFT is both socially useful and necessary, but also meaningless and impossible (because the future remains unknown). To illustrate the nuances of hydropower decision-making, the paper contends that the necessary/impossible DRIFT paradox is best dealt with by

employing a relational system-environment model, as opposed to an essentialist Aristotelian parts-whole model. This is because where the latter typically employs rational reasoning to show why DRIFT results are holistic, the former takes into account that holistic DRIFT results are contingent on the observer, on an organisation's position within a network of social systems. Hence, a relational approach differs because it acknowledges that DRIFT results are neither necessary, nor impossible, but are contingent depending on how social systems are able to temporalise their own modes of observation. In practice, this means only if diagnosis first captures how and why each social system (law, economy, politics, science, etc) employs a specialist criterion of success and relevance, is it possible to work out how these systems interact, hang together, contradict or reinforce each other to form the results of DRIFT. Indeed, this is what the three-step relational framework of *variation*, *selection* and *retention* aims to recapture.

> *Variation* captures the repertoire of possibilities afforded by social systems, when the selection is made by the MRC to implement DRIFT scenario planning and retain legitimacy in decision-making.
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> *Selection* captures how the MRC's DRIFT (in)decision processes routinely emerges from the conflicting requirements of different social systems.
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> *Retention* captures the MRC's ability to register and process the variable conditions which may interrupt the link between the decision-making paradox of selection and variation, between present futures (which takes DRIFT results as given), and future presents (which facilitates a poly-contextual worldview of DRIFT results).

The contribution here of this relational framework is that by raising the level of abstraction, this enables the analysis to point to the complexity of modern society, and thus provide an innovative set of paradigms for disciplining the criticism of ‘holism’ in DRIFT decision-making. Of course, this disciplining is not to deny the claims of sceptics which scrutinise the impossibility of holism, nor is it to suggest that proponents which advocate the necessity of holistic ‘integrative approaches’ are futile aspirations which should be given up. But what the framework does do is transcend the two camps, by reformulating the problem of holism not as a question of whether the MRC's DRIFT offers more rational capacities for problem-solving, but as the problem of how to develop a potential for tolerating the otherwise intolerable – that the crucial performance of organisational decision-making is less the fixation of holistic aspirations, and more the responsivity of utilising the vast horizon of temporal differences for coping with complexity.

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References

Alberts, H. C., Alberts, R. M., Bloom, M. F., LaFlamme, A. D., & Teerikangas, S. (2004). The Three Gorges Dam Project from a systems viewpoint. Systems Research and Behavioral Science, 21, 585– 602. https://doi.org/10.1002/sres.604

Allen, P. M. (2000). Knowledge, ignorance, and learning. Emergence, A Journal of Complexity Issues in Organizations and Management, 2, 78– 103.

Andersen, N. Å. (2003a). Polyphonic organisations. In T. Hernes, & T. Bakken (Eds.), Autopoietic organization theory (pp. 151– 182). Oslo and Copenhagen: Liber & Abstract, Copenhagen Business School Press.

Andersen, N. Å. (2003b). The undecidability of decisions. In T. Hernes, & T. Bakken (Eds.), Autopoietic organization theory: Drawing on Niklas Luhmann's social systems perspective (pp. 235– 258). Oslo: Copenhagen Business School Press.

Barlow, C. (2016). Conflicting agendas in the Mekong River: mainstream hydropower development and sustainable fisheries. In W. W. Taylor, R. Welcomme, D. M. Bartley, C. I. Goddard, & N. J. Leonard (Eds.), Freshwater, fish and the future: proceedings of the global cross-sectoral conference (pp. 281– 287). Rome: Food and Agriculture Organization of the United Nations.

Borch, C. (2011). Niklas Luhmann (Key Sociologists). Oxon: Routledge.

Campbell, L., Suhardiman, D., Giordano, M., & McCornick, P. (2015). Environmental impact assessment: Theory, practice and its implications for the mekong hydropower debate. International Journal of Water Governance, 3, 93– 116.

Djanibekov, N., Van Assche, K., & Valentinov, V. (2016). Water Governance in Central Asia: A Luhmannian Perspective. Society & Natural Resources, 29, 822– 835.

Dore, J., Lebel, L., & Molle, F. (2012). A framework for analysing transboundary water governance complexes, illustrated in the Mekong Region. Journal of Hydrology, 466-467, 23– 36.

Fuchs, S. (2009). Against essentialism: A theory of culture and society. Cambridge, Mass: Harvard University Press.

Habermas, J. (1984). The theory of communicative action (Vol. 1: Reason and the rationalization of society, trans. Thomas McCarthy). Boston: Beacon.

Islam, S., & Susskind, L. E. (2012). Water diplomacy: A negotiated approach to managing complex water networks. New York: Routledge.

Kang, K. (2018a). Making paradoxes invisible: international law as an autopoietic system. International Journal of Law in Context, 14, 315– 334. https://doi.org/10.1017/S174455231700026X

Kang, K. (2018b). Making Use of Paradoxes: Law, Transboundary Hydropower Dams and Beyond the Technical. Law and Critique, 29, 107– 128. https://doi.org/10.1007/s10978-017-9199-2

Kang, K. (2019). On the problem of the justification of river rights. Water International, 1– 17. https://doi.org/10.1080/02508060.2019.1643523

Keskinen, M., & Kummu, M. (2010). Impact assessment in the Mekong—Review of strategic environmental assessment (SEA) & cumulative impact assessment (CIA). Espoo: Water & Development Publications - Aalto University.

King, M., & Thornhill, C. (2003). Niklas Luhmann's theory of politics and law. Basingstoke, UK: Palgrave Macmillan.

Lahmeyer International (2004). In M. Limited (Ed.), Power System Development Plan for Lao PDR. Auckland, New Zealand: Department of Electricity.

Lejano, R., Ingram, M., & Ingram, H. (2013). The power of narrative in environmental networks. Cambridge, MA: MIT Press.

Luhmann, N. (1976). The future cannot begin: temporal structures in modern society. Social Research, 43, 130– 152.

Luhmann, N. (1995). Social systems. Stanford, California: Stanford University Press.

Luhmann, N. (2000). Organisation und Entscheidung [Organization and decision]. Opladen: Westdeutscher Verlag.

Luhmann, N. (2004). Law as a social system. Oxford: Oxford University Press.

Luhmann, N. (2012). Theory of Society. Stanford: Stanford University press.

Luhmann, N. (2018). Organization and decision. Cambridge: Cambridge University Press. https://doi.org/10.1017/9781108560672

McManamay, R. A., & Bevelhimer, M. S. (2013). A holistic framework for environmental flows determination in hydropower contexts. ORNL/TM-2013/159. Oak Ridge National Laboratory.

Moeller, H.-G. (2012). The radical Luhmann. New York: Columbia University Press.

Molle, F. (2008). Nirvana concepts, narratives and policy models: Insights from the water sector. Water Alternatives, 1, 131– 156.

Opitz, S., & Tellmann, U. (2015). Future Emergencies: Temporal Politics in Law and Economy. Theory, Culture and Society, 32, 107– 129.

Perlaz, J. (2005). In life on the Mekong, China's dams dominate, the New York times. New York: The New York Times Company.

Philippopoulos-Mihalopoulos, A., & Webb, T. E. (2015). Vulnerable bodies, vulnerable systems. International Journal of Law in Context, 11, 444– 461.

Plaza-Úbeda, J. A., Pérez-Valls, M., Céspedes-Lorente, J. J., & Payán-Sánchez, B. (2019). The contribution of systems theory to sustainability in degrowth contexts: The role of subsystems. Systems Research and Behavioral Science, 1– 14. https://doi.org/10.1002/sres.2600

Rabinow, P. (2008). Marking time: On the anthropology of the contemporary. Princeton, NJ: Princeton University Press.

Richey, J., Logsdon, M., Rodda, S., Nijssen, B., Lettenmaier, D., & Snidvongs, A. (2000). SEA-BASINS: Towards a coupled hydrological and material transport model of Southeast Asia and the Mekong River system, Proceeeding of the workshop on hydrologic and environmental Modelling in the Mekong Basin (pp. 40– 62). Phnom Penh: Technical Support Division, Mekong River Commission MKG.

Roth, S. (2017). From Added Values to Augmented Realities. Introducing the Special Issue of Management and Functional Differentiation. Systems Research and Behavioral Science, 34, 131– 138.

Salzman, J., & Thompson, B. J. (2007). Utilitarianism and cost-benefit analysis. In J. Salzman, & B. J. Thompson (Eds.), Environmental law and policy. New York: Foundation Press.

Saravanan, V. S., McDonald, G. T., & Mollinga, P. P. (2009). Critical review of Integrated Water Resources Management: Moving beyond polarised discourse. Natural Resources Forum, 33, 76– 86.

Sverdup-Jensen, S. (2002). Fisheries in the lower Mekong Basin: Status and perspectives, MRC Technical Paper. Phnom Penh.

Valentinov, V. (2014). The Complexity–Sustainability Trade-Off in Niklas Luhmann's Social Systems Theory. Systems Research and Behavioral Science, 31, 14– 22.

WB and ADB. (2006). Joint working paper on future directions for water resources Management in the Mekong River Basin, Mekong Water Resources Assistance Strategy (MWRAS): World Bank and Asian Development Bank.

Wyatt, A. B., & Baird, I. G. (2007). Transboundary Impact Assessment in the Sesan River Basin: The Case of the Yali Falls Dam. International Journal of Water Resources Development, 23, 427– 442.