Thinking globally and acting locally in Mindanao: 
Supporting the delicate balance of future sustainability in 
South-East Asian wilderness as well as rural areas

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Abstract. Although models of future sustainability often talk about effectively balancing economic, social and environmental imperatives or factors, in practice this typically remains an elusive ideal. This paper explores the exemplary possibilities but also dilemmas of a proposed initiative in the resource-rich but under-developed Filippino island province of Mindanao to achieve such a delicate balance in practice. This initiative by Raintrust Sustainable Ventures’ proposes to link foreign investment in agricultural development to both the social advancement of local tribal peoples and the protection of large amounts of remaining wilderness areas. Such a case study provides an exemplary basis for discussing the challenge of achieving social and environmental as well as economic domains of ’future sustainability’. The crucial supporting role of information and geospatial technologies in the Raintrust plan will also be discussed.

1. Introduction: The opening up of Mindanao to future sustainability?
The resource-rich province of Mindanao, also the second largest island in the Philippines, has long remained relatively undeveloped because of political tensions, armed conflicts, and associated displacements of a significant proportion of the population. However the 2012 Framework Agreement on the Bangsamoro between the Philippine Government and the Moro Islamic liberation Front has given an in-principle agreement to not only significant local autonomy in the future but various associated partnerships for future development. The government commitment to this has encouraged renewed interest in the related challenge of harnessing the natural and human resource potential of the island for sustainable future local and national benefit [1]. As well as large Christian and Muslim populations there are also eighteen local Filippino tribal groups in Mindanao still attached in varying degrees to a traditional or at least rural way of life typically viewed in modern urban terms as merely economic subsistence. Much of the island, especially the lowlands of the South, has already been deforested over the decades since the Marcos regime. Yet, Mindanao still contains relatively large areas of tropical rainforest in the mountainous areas of the North.

The paper will explore the challenge of effectively balancing economic, social and environmental imperatives or factors when it comes to trying to envision plans of future sustainability. The first part of the paper will discuss the kind of integrated systems framework needed to sustainably connect the so-called ‘pillars’ of sustainable development (i.e. economic, social and environmental sustainability). This
will be linked to how the current dilemmas of Mindanao exemplify future global significance. On this basis the second part of the paper will focus on the exemplary possibilities but also challenges represented by the plans of the Raintrust initiative. It will further discuss how related models of information and related geo-spatial or ‘digital earth’ technologies might also be used to promote global partnerships for local self-sufficiency.

1.1. Towards a self-organising systems framework for future sustainability

Following the 2005 World Summit on Social Development, it has perhaps become fashionable to talk about the ‘three pillars of sustainability’ as if economic, social, and environmental imperatives were ultimately quite independent. Obviously this is not the case and that a sustainable natural environment is a precondition of human social (and physical) life which in turn is a foundation of economic activity, exchange, and innovation. This means that any framework and reference point for future sustainability should really start with dynamic earth system models which recognizes that the planet is a self-organising system which for billions of years has been directed at supporting habitability for emergent physical, chemical, biological, social, and human components. Such was the key insight of Lovelock’s Gaia hypothesis [2] – at long last accepted in principle by influential sections of the scientific community in the 2001 Amsterdam Declaration. Such a view represents a fundamentally different starting point from various versions of a modern ‘profits and progress’ ideology which tends to view nature as an endlessly available and exploitable resource for economic and social ‘growth’. One of the crucial keys to such a paradigm change in human thinking and acting is how human knowledge like nature inevitably functions as a dynamic ‘ecosystem’ – that is, as an emergent, self-organizing system involving a delicate balance between internal imperatives of adaptation to complex external environments [3].

Table 1. depicts a self-organizing systems view of how environmental, social and economic sustainability represents interdependent internal, external, and convergent axes of alignment perpetually in an interplay (or not) of ‘delicate balance’. New versions of complex systems theory are recognizing social as well as physical and biological systems function in related ways as both container and part of other interdependent systems as well as in terms of adaptation to complex, changing external environments [4]. In terms of this internal-external interplay we might outline three linked axes common to any system: the internal axis being a function of system integrity of self-organization or accountability, and an external axis relating to the feedback loop of interaction. The table notes a corresponding tension between surface vs. deep modes of self-organization or accountability (and various related functions such as leadership on one hand, and on the other open vs. closed (also negative vs. positive) modes of feedback. In this way a convergent axis achieves an independent mode of resilience if the internal and external axes are sufficiently in alignment and – if not – rather a co-dependent (or parasitic) resilience. In terms of a local-global rather than just internal-external interplay, self-organising systems can also be viewed in terms of foundations of capacity linked to ‘external’ environments which support higher ‘internal’ functions. For instance, the third column of Table 1 depicts how the so-called three pillars of environmental, social and economic sustainability correspond to the ‘axes’ of a systems view of the hierarchy of human needs.

Table 1. A self-organising systems view: The three ‘axes’ (not just pillars) of sustainability.

| Modes of sustainability (also hierarchy of needs) | ‘Internal-external’ adaptation to complex environments | Translated into a foundation for the pyramid of human capacity-building |
|--------------------------------------------------|-----------------------------------------------------|---------------------------------------------------------------------|
| Economic (vs. cultural)                          | Internal axis (energy/time)                         | Surface vs. deep accountability (purpose)                            |
| Social                                           | Convergent axis (emergence)                        | Independent vs. co-dependent resilience                             |
| Environmental                                    | External axis (information/space)                  | Open vs. closed feedback (foundational)                             |

In his Revenge of Gaia (2006) Lovelock persuasively argued the case for urgent action to try and re-stabilise the increasingly out-of-control amplification of global climate change effects which are accelerating towards an irreversible stage. With his perspective on the crucial role of wilderness areas as
As oceans to support the sustainable habitability of the planet, he provides a further useful starting point for any substantial model of future sustainability. Exemplifying a systems approach which corresponds to the model of three convergent axes of sustainability outlined above, he argues that nations should at least aim to balance land-use in roughly three equal parts: urban (and related built or industrial) environments, rural domains of food-growing, and wilderness areas (the last third) ‘to be used once again for (their) proper purpose, the regulation of the climate and chemistry of earth’. This perspective adds authority to concerns that non-sustainable industrial models of farming and agriculture linked to a late 20th Century corporate imperative are causing significant land degradation as well as various other non-sustainable aspects of human-nature disconnection. Such imperatives are selectively providing reductive as well as retrospective justifications for failing to recognize the interdependent links between environmental, social and economic factors. Conversely it supports the insights of the ‘ecological footprints’ model.

Future sustainability will need to be linked to a new paradigm of urban settlement in which a much better delicate balance between local self-sufficiency and global interdependence is achieved in every aspect of life extending from food resources to proximity to work, transport and community centres. In place of the out-of-control mega cities which blindly attract surplus populations from rural areas in the Philippines as elsewhere (many dispossessed of their land and others no longer able to maintain adequate subsistence), an integrated systems model projects the notion of globally networked and sustainable local communities also balancing traditional functions and modern modes of global access to a digitally networked world – the foundation for an emerging global consciousness as an antidote to a merely self-interested ‘profits and progress’ rationale. It provides a framework for further supporting the corporate social responsibility (CSR) rationale that this new paradigm is also in is the long-term interests of what Weiss calls the ‘state-corporate nexus’ [5]. Modern peoples have generally lost the kind of local indigenous knowledge systems (i.e. convergent sustainability thinking) which largely focused on preserving rural as well as wilderness areas around the world. There are a number of innovative ways in which the people of the rainforests and other wilderness areas might potentially balance environmental and social sustainability on one hand with economic development on the other [6]. As we have discussed elsewhere [7], ecotourism and associated activities to produce and sell handicrafts and natural health products represent such a strategy.

1.2 Local vs. global dilemmas of ‘sustainable development’ in Mindanao (and elsewhere)

The opening up of Mindanao at this time presents opportunities as well as challenges for all stakeholders. Many of the local communities have struggled with poverty, violence, and disenfranchisement because of various issues extending from religious tensions to provincial challenges (on the basis of ethnic and religious as well as regional autonomy grounds) to the central Philippines government. However, as indicated in the negotiation of the Mindanao peace process the Philippines government has come the hard way to realize and acknowledge that genuine mutual accommodation is the sustainable way to go in the long-term in the national as well as local (and also global) interest. With better infrastructure, access to education and work, and genuine efforts to address if not immediately resolve the tensions of political and religious marginalization, then this can all be a win-win convergence of economic, social and even environmental sustainability involving an ultimately interdependent diversity of distinct interests. In such ways we think that Mindanao currently represents an exemplary study of the urgent challenge to get the right balance in coming years between economic, social, and environmental sustainability in terms of diverse local and also global stakeholders.

In Mindanao the traditional tribal ownership of land is at least nominally recognized by the Philippines government in such forms as its Indigenous Peoples’ Rights Act of 1997 [8]. In Mindanao the focus will be on whether a sustainable plan for partnerships will be able to sufficiently harness but also responsibly maintain the rural food-growing areas of the Central and Southern areas in particular. This will perhaps also entail some kind of balancing between traditional modes of sustainable farming and soil management on one hand, and on the other corporate (e.g. mono-cultural, mechanized, and plantation-based) methods of industrial farming. As Weiss has outlined, this is a contrast to be made between ‘through-flow
industrial agriculture’ mechanically based on ultimately non-sustainable synthetic fertilisers and largely petro-chemical based pesticides on one hand, and on the other ‘nutrient-cycling soil management (e.g. multicropping patterns, green manures, rotations and fallowing, and the pasturing of small livestock populations on fallow land and crop stubble’ [9].

If there was acceptance of the principle that the traditional knowledge systems of tribal peoples might also be harnessed to help preserve the remaining rainforests of Mindanao, then there will be an important role for the Higaunon, a traditionally nomadic tribal people of the mountain areas (many still forested) in North-Central Mindanao. The Higaunon are one of the most interesting, unique, and sophisticated tribal knowledge systems or cultures in Mindanao [10]. They are derived from the Austronesian ethnic group like other Filippino tribes yet also have their own unique language and a rich oral cultural tradition including a set of customary laws (the Buncatol Ha Bulawan). It is a tradition informed by an animistic ethos that humans have a spiritual duty to both their ancestors and nature spirits to protect and live in harmony with the natural environment. This is an ethos still strongly felt and embraced even as many in this tribe have been converted to Christianity in recent decades. Indeed at times in the recent past the commitment of the Higaunon to their land, the forests, and sustainable environment more widely is such that they have on occasions taken up arms to defend their land against illegal logging activities.

2. The Raintrust initiative: An exemplary study of the dilemmas of future sustainability?

The proposed Raintrust initiative in Mindanao represents an exemplary case study of the challenges and opportunities of trying to balance social, economic and environmental sustainability (www.raintrust.com). With the support of the Philippines Government Raintrust is aiming to link up trans-national corporate as well as Philippine investors in ways that aim to benefit local communities and involve an integrated land management plan also preserving existing wilderness areas. Raintrust’s long-term ‘eco-nomics’ model anticipated the similar ‘green economy’ model promoted by the United Nations Environmental Program [11]. In Raintrust’s Mindanao initiative this involves a two-pronged strategy which converges in terms of a related integrated management plans to get formal agreements between the key stakeholders to balance the use of existing farmlands and deforested areas for cash crops with the preservation of remaining fragile wilderness areas.

The first tier for the Raintrust initiative involves effective ‘rental’ of suitable and approved lands for shared profits with the local tribes (and an associated global-local industry partnership model) which must be committed to capacity-building. As well as palm oil crops there are also plans to plant and harvest napier grass a fast-growing crop able to last many years with multiple harvests each year. This would be part of a ‘green plan’ to power electricity stations in Mindanao to replace expensive imports of coal from Indonesia with renewable biomass alternatives. Raintrust aims to build state of the art mills to generate energy from the biomass byproducts and also recycle waste effluent from the processing of palm oil and napier grass. The second tier of the initiative relates to associated activities of land-use and community development as well as environmental management and preservation which Raintrust plans to support in its integrated plans. As well as plans to involve local peoples in various industrial agriculture activities there are plans to promote a range of smaller-scale activities to provide diversity and balance in relation to the ‘mono-cultural’ tendencies of the main cash crops. Raintrust aims to ensure that local profits will be directed at community capacity-building involving also education, health-care, housing and community facilities on one hand, and on the other micro-financing of local enterprises and initiatives. In many areas of Mindanao both tiers will also need to be reconciled with existing food crop farming. One of the companies which has reportedly shown interest in Raintrust’s Mindanao initiative is the Cargill group (www.cargill.com). The Raintrust Mindanao initiative proposal thus also represents an opportunity for a corporate player like Cargill to (a) apply a deep practical rather than merely superficial application of CSR principles and rhetoric and (b) also take a leadership role in the kind of convergence of different and often conflicting interests needed for future sustainability [12].
2.1 A digital earth to support future sustainability in Mindanao (and elsewhere)?

As part of its strategy to promote a ‘middle way’ to future sustainability in Mindanao – that is, to promote long-term economic development and social as well as environmental sustainability - Raintrust has conceived an innovative use of ‘digital earth’ technologies and associated models of evaluation (geospatial technologies, geographic information systems and digital mapping, etc.) to support this. This part of its operations is called the RainTrust Global Net. Raintrust also aims to fully develop and converge this support strategy in relation to its associated plans (currently being negotiated) to operate a boutique internet television site (RainStorming) devoted to this. Raintrust is further are attempting to achieve an innovative convergence through the exemplary possibilities of Whirl Wind Java. This open source software was developed in partnership with NASA. Designed to run on personal computers with 3D acceleration, World Wind Java wind has several functions which make it exemplary and also a software award winner by NASA [13]. It allows powerful visual animations to be transposed on topographic maps, aerial photography, and satellite imagery – a stunning convergence of reality, virtuality and mapping functions. But its exemplary aspect is to allow users to ‘zoom-in’ from satellite altitude to any local context on the planet. Exemplified by its representations of NASA’s ‘blue marble’ tree-color image of the entire planet, it does this using high resolution from Satellite databases such as Landsat 7 and SRTM. Raintrust is also making use of related maps and the geospatial monitoring functions of unmanned aerial surveillance provided in the local context by a local company (http://www.skyeye-project.com/)

![Diagram](image)

**Figure 1.** Figure of the interplay of local self-sufficiency and global interdependence frames the hierarchy of human needs also in integrated ‘cross-factor’ uses of digital mapping.

Raintrust’s related aim then to promote, develop and converge a strategy of future sustainability is supported by an associated strategy to harness the convergent possibilities exemplified by the World Wind Java software. The digital mapping functions of World Wind Java represent a convergence which powerfully cuts through and goes beyond the conventional notion that the main function of geospatial technologies is to provide a *set of information layers* to transposed on the geography or landscape of the planet. In its representations to potential investors and partners, Raintrust do indeed make use of a conventional set of maps. This can be recognize to also correspond to the three domains of physical, social and human activity. As reflected in various kinds of topographic maps relating to the terrain and physical level then is the foundation for surface of the planet. Beyond this there are the global contexts of weather patterns by land, sea and atmosphere. A social domain also different kinds of rural and urban land-use in contrast to wilderness areas. And a third human activity domain provide an axis for recognizing and demonstrating how in time as well as in space changing patterns are emerging with additional information. In other words, World Wind Java usefully conveys the suggestion of James Lovelock that the biosphere is a real-life self-organizing system which includes and goes beyond multiple layers of information.
Such an approach provides an exemplary use of digital earth technologies for purposes of modeling, supporting and planning sustainability strategies and practices [14]. This is a model of how global interdependence and local self-sufficiency are not only complementary but can be dramatically linked together in terms of how both local and global partners can use new digital technologies for also linking virtual networks of communication with mapping specific areas of local environment. This suggests the potential for collective versions of the so-called ‘overview effect’ (a cognitive shift in awareness) reported by some astronauts and cosmonauts during spaceflight when viewing the planet for the first time. Conversely this model also provides a focus for local peoples to not only digitally monitor their land and the activities of others on it but also to likewise to link to global telecommunications and support the planned community telecentres to be financed by associated agreements. Fig 1 outlines how this use of digital earth technologies to link the global and local domains of knowledge-building corresponds directly with an integrated systems model of how the hierarchy of human needs is inevitably grounded in the planet’s natural ecosystems.

3. Conclusion
In relation to the example of the Raintrust initiative, the paper has outlined a self-organizing systems framework and model for referring to the three axes (rather than pillars) of future sustainability. It proposes that such a model is required to more effectively understand and appreciate how the progressive interplay of environmental, social and economic (vs. cultural) sustainability needs to be also better aligned with the planet’s capacity to function as a self-organizing system itself. As discussed, this will also need to balance sustainable models of urban and rural development in terms of the potential application to Mindanao of James Lovelock’s prescription that ultimately the protection of the planet’s ‘homeostasis’ system (especially in terms of human management of wilderness as well as rural areas) is truly the foundational key to future sustainability. The paper has further discussed how Raintrust’s innovative use of digital earth technologies can also provide an exemplary and supporting foundation for building integrating models of the human interaction with the biosphere – and also the often contrary tendencies of global interdependence and local self-sufficiency.

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