Reconciliation with Nature through the Fourth Industrial Revolution

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Abstract

The people of Bali, the Island of the Gods, offer sacrifices daily to thank Sang Hyang Widhi Wasa for the peace they experience with nature. But nature is not at peace with the people of Bali, or anywhere else, because people use technologies of past industrial revolutions that harm the balance with nature, and nature is responding with harm to humanity. This paper asks how we can change this, using the capabilities of the fourth industrial revolution, in order to placate nature. Misuse of technology is not confined to Bali and the Balinese, but affects all of humanity, whether Hindu, Muslim, Buddhist, Christian, or whatever belief or no belief. After describing some key ways we do harm to nature by misuse of old technology, and nature's retribution (including climate change, air pollution, plastics, abuse of land and water) the paper suggests some distinctly Balinese and Indonesian ways to address them, and a summary of the political and administrative changes that this would require. It concludes with thoughts on the relevance of this for the rest of the world.

Keywords

Governance of Information Technology; Public Administration; Climate Change

Introduction

Apology[1]

In the fine tradition in Indonesia, I make an apology, that I am not a researcher, and this paper is not supported by data and analysis. It is an opinion piece about a matter which I am passionate about. And sure, research is needed, and perhaps my appeal here will attract some to take a more rigorous approach to this subject.

Bali

I first came to Bali in 1971. I was impressed by Balinese layouts of villages and houses. The road from Gilimanuk was lined with trees and in the towns and villages I passed there were gardens in front of high walls, with decorative gates into courtyards with more trees around the houses. In villages and towns there were shops and markets and temples, with remarkable architecture shaded by trees. And everywhere people had placed small offerings of sacrifice thanking *Sang Hyang Widhi Wasa* for harmony with nature.

Just after passing through Sempidi, there was a panorama over paddy fields extending far into the distance, I imagined almost all the way to Kuta. All I could see was paddy and trees, and under the trees a glimpse of roofs of houses, a wonderful orchestration of the natural environment that enabled the Balinese to benefit richly from Nature. The prayers and offerings were not asking for something, for the people had created a balance with Nature, and the offerings were their thanks.

The landscape of so much of Bali has changed. So much is no longer dominantly rural. The view after Sempidi is of rows of shop-houses. It no longer represents a balance with Nature. Along almost every road they are chopping down trees for car-parking at new supermarkets. And rubbish is everywhere.

The well-known Balinese cartoonist Gus Dark illustrates the new inconsistency between what Balinese believe and what they do in the accompanying cartoon.

Balinese still apply many old rules for ordering the environment. They offer small sacrifices daily to thank *Sang Hyang Widhi Wasa*, the Divine, for the peace they experience with nature. But most offerings no longer demonstrate harmony between Nature and the man-made environment, because the harmony is progressively being lost. Whereas before offerings praised the connectivity between Nature and human endeavour, now they illustrate disconnection.

It is not the offerings that are at fault; the people of Bali are to be admired for their conviction and their offerings of thanks. But Bali is clearly losing something of great value, the very relationship between humans and Nature, as illustrated again by Gus Dark as in this second cartoon.

Things have changed more in Bali since the Covid-19 pandemic. Tourists have left, masses are unemployed. Sitting at home I have no clue of what life is like on the outside except through social media. And on social media there is a wealth of discussion on what needs to change, what many people are doing about it, and how little the government is doing about it.
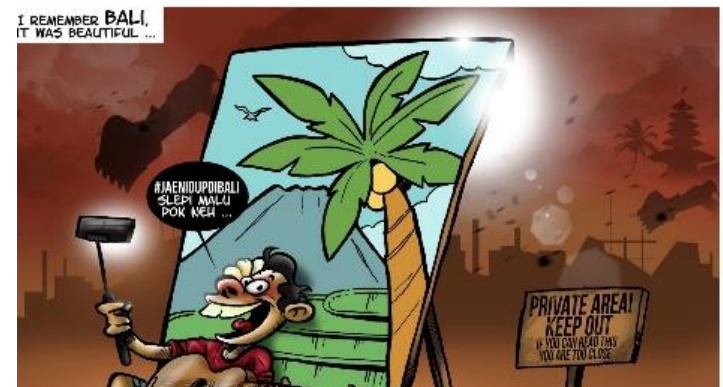
Figure 1 – Untitled
(https://www.instagram.com/p/B0JwFgpglHp/, accessed December 19, 2022), © Gus Dark Art
(https://www.instagram.com/gus_dark_art/), 2019

Nature sometimes strikes at people, not as a result of our misuse of technology, but just because the earth is dynamic. In December 2004 a tsunami struck Aceh. It was not, as some thought, a punishment, but an opportunity for those who wished to see it as such, to get rid of the Old Aceh and make a New Aceh. And thus, with recovery came peace after decades of civil unrest. In 2019 I was invited to speak to a conference on how Aceh should prepare itself for the fourth industrial revolution (4IR), and I spoke of the power of nature to strike because of our misuse of technology, the destruction of forests, plastics pollution, and particularly global warming due largely to the combustion engine. And I related the problems the world now faces in religious terms, reflecting the religiousness of the Acehnese. I referred to the use of technology of past industrial revolutions in ways that harm Nature as sins, because God instructed Adam to take care of creation. I appealed to the Acehnese to use and develop 4IR more than just wisely, but use it as placation for those sins, begging forgiveness of Nature for what we have done wrong. (Podger, 2019a).

Aceh

Figure 2 - Untitled
(https://www.instagram.com/p/Bs2gzKBh8PC/, Accessed December 19, 2022), © Gus Dark Art
(https://www.instagram.com/gus_dark_art/), 2019

Indonesia's new capital

Before the President of Indonesia, Joko Widodo, decided to build a new national capital city in East Kalimantan, universities in Palangka Raya, Central Kalimantan, held a conference in 2018 on the suitability of their town to become the new capital; they invited me to contribute. I presented a case that modern information technology and modern concepts of urban development should make a new capital very different to previous new capitals like Washington, D.C., USA or Canberra, Australia. No need for cars, as most people can work from home; politicians can spend most of their time in their electorates, just virtually connecting to the capital for virtual parliamentary sittings. The city would be dense and green at the same time, by appropriate use of 4IR (Podger, 2018c).

Outline of my paper

I want to look at the two most dominant changes the world is facing, 4IR and potential environmental catastrophe, and what are the implications for public administration.

I start with a look at the harm we do to Nature and Nature's retribution. Then I suggest how we can use modern information technology in some distinctly Balinese and Indonesian ways as well as some international ways to address these. Then I present a set of hypotheses of what we in public administration might do and call for discussion of ways that might lead to the paradigm change in public administration that is needed.

Industrial Revolutions, Sins and Punishments

On October 4, 2019, someone called *Campurhan Movies* posted on Facebook:

We were having a discussion with a Mangku / Balinese priest and he shared that in Bali: there are three levels—the Trees, the Animals, and then the Humans. He said that humans belong to the lowest level although they are the most clever.

Someone laughed and said, "What?! Animals are higher than humans?"

Then someone else forwarded Figure 3 to me.

Figure 3 - Untitled
(https://americasbestpics.com/picture/the-world-of-humans-the-world-of-animals-GOCmLPO19, Accessed December 19, 2022), © icreativeideasirl
(https://americasbestpics.com/user/icreativeideasirl)

Some natural catastrophes are just Nature doing Nature's work, as in the tsunami in Aceh. Other catastrophes are Nature punishing us, but those who suffer the punishment are not likely to be those who have harmed Nature. Nature does not have police or courts or appeals. It responds to what we do and its punishment is upon whoever is in the way. Of the many ways we have not used past technology wisely and upset Nature, I select a few for illustration.

War and espionage

The history of war is a history of technological innovation to kill better, to kill people and to kill nature, sometimes suddenly and sometimes slowly. Hiroshima was sudden mass destruction followed by slow and terrible suffering over decades. Bombs from WWII are still killing people.[2] And 4IR is already being used to make war even more devastating.

The history of espionage is, like the fiction, full of the latest technology used to promote national interests rather than global interests.

Combustion and traffic

Pollution is the number one killer, killing 7 million people every year, more people than war. We steal from nature instead of cultivating it. Traffic is the number two killer.

Monoculture

Monoculture does not care for the environment but abuses it.[3]

Climate change

Indonesia is a country highly vulnerable to disasters that are likely to worsen with climate change. Other parts of Indonesia are more vulnerable than Bali, as seen by the most recent cyclone that struck the eastern islands. It is predicted that climate change will bring more frequent cyclones, storm surges, flooding, coastal erosion, landslides, droughts, and fires.

Rubbish and plastic

They say 8.3 billion metric tonnes of plastic have been produced since the early 1950s, and most of it is still out there in the environment, much of it strangling things. We have all seen videos of seagulls and fish struggling with face-masks and plastic nets, and videos of huge swirling oceans of accumulated plastic waste. And we all wonder, what is the health hazard of microplastics in our food supply?

Urbanisation

It is in its towns and cities that Bali is losing its link to Nature. That view from Sempidi that I saw in 1971 was lost through uncontrolled urbanisation. Ribbon development is like a blood cancer that clings to the arteries throughout Bali. Greater Jakarta is soon to become the largest urban conglomeration in the world, home to over 25 million people, all living on some of the most fertile land in the world.

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[2] See https://www.abc.net.au/news/2021-05-11/us-japan-wwii-bomb-explosion-blast-honiara-solomon-islands/100128436?utm_medium=social&utm_content=sf245753847&utm_campaign=fb_abc_news&utm_source=m.facebook.com&sf245753847=1&fbclid=IwAR3rCJEn06c7UtNzLPIzwCPXAegU2i1ndUQ7xNB5HFTrfMT4s-68wXjGPQI. Accessed December 19, 2022.

[3] See https://zh-cn.facebook.com/PermaculturePirates/posts/poly-culture-vs-mono-culture/2319617371458205/ (Accessed December 19, 2022).

The potential of 4IR

War

While 4IR is already being used to create more devastating war, there are many ways 4IR can help work for peace. Here are some examples:
- Design of peace treaties including technologies for detecting compliance;
- Early detection of conflict and information for peace-keeping;
- Adapting existing national defence technology for global peace rather than counter-attack;
- Fast response of relief measures;
- Detecting unexploded mines and bombs.

Combustion and traffic

If the 4IR solution to death by traffic is innovative public transport, then we will need not just buses and trains and clever software for booking our trips, we need to reshape our cities:
- We will have to prioritise pedestrians and bike-riders, so it is easy, safe, and comfortable in the heat and rain to walk to work and for our children to walk and cycle to school;
- We need to get more people out of cars and motorbikes and get them walking more;
- We need higher density around transport nodes and roads designed to prioritise pedestrians and public transport;
- And for goods and public transport, we need a substitute for fossil fuels.

    All of these can be helped with sophisticated 4IR technology.

Monoculture

Multi-cropping is not new. It comes from ancient agricultural traditions, and a Balinese, I Wayan Katun Tirtayasa, introduced it to Indonesian national policy in the 1970s. With 4IR we can go beyond multi-cropping to create highly productive biodiversity. This will require extensive research investment.

Climate change

Climate change science uses the most advanced 4IR for long-term modelling of weather change, and for short term predict extreme weather events. With 4IR we can be better prepared.

    Modelling is already being used to promote the urgency of mitigations. The International Energy released a report in May 2021, based on extensive research, stating that achieving zero carbon emissions is possible by 2050, but, "The path to net-zero emissions is narrow. Staying on it requires the massive deployment of all available clean energy technologies — such as renewables, EVs and energy efficient building retrofits — between now and 2030" (IEA, 2021, p. 14).

    This massive deployment of all available clean energy technologies means massive use of 4IR.

    The modelling is also critical to determine wise decisions on adaptation: how to defend coastlines, how to improve effectiveness of flood-control measures, how to anticipate landslides, and so on. There is an almost endless list of ways that 4IR can assist in creating localised models on which to base adaptation.

    But what can Bali and Indonesia do about mitigation of and adaptation for climate change? I am hoping that Bali and Indonesia can set an example, becoming leaders in researching and resisting climate change, using the best available technology wisely to do so. I propose ideas for the changes we have to make to our public administration system below.

Flood control

One use of 4IR technology that has been proposed for decades is in modelling floods and linking rainfall and run-off to early warning systems and flood control measures.

Bio-diversity and change

4IR can be used also extensively for determining the impact of climate change on nature, not only for changing crops to maintain agricultural productivity, but also to preserve bio-diversity.

Carbon accounting

Carbon accounting is essential to measuring performance of climate change mitigation efforts. Carbon accounting for organisations and projects is guided by International Standards[4] but as yet few countries actually require businesses and projects to calculate their carbon footprint. And few schools include education in carbon accounting. But what we need is more complex than just following such standards. The key issues still to be addressed would appear to me as:

- The proper consolidation of carbon accounts. How do we measure overall effectiveness of our efforts, and match consolidated accounts with climate data? How do we determine where additional effort is needed, by industry and countries?
- How do we avoid double accounting?
- How do we relate carbon accounting with financial accounting? For example, relating the effectiveness of carbon dioxide reductions to the costs of achieving them?

Rubbish and plastic

Gotong royong is the Indonesian term for organised community self-help, usually applied to cleaning the environment. *Gotong royong* is alive and well in Bali, cleaning beaches and rivers and roadways. And *Medsos* (social media) is transforming *gotong royong*. The way society and government work together is ripe for new innovations.

And 4IR can be used in so many ways. The simplest way is by using CCTV and everyone's handphone to detect improper disposal of waste, and where vehicle numberplates can be detected, by sending instant notice to offenders. Smart Balinese and Indonesians could contribute to this, if only government would commission their services.

At the high end of technology, all packaging can now be individually coded, and packagers, shops, and customers can be held accountable for their proper disposal.

Urbanisation

Urban development planners already have a good understanding of climate change mitigation in urban planning, including Transport Oriented Urban Development and the need for greening our cities. The first is needed to reduce our dependence on private transport, and the second to cool our cities and sink carbon.

4IR already blurs the difference between city and countryside, as we work from home rather than go to the office and as manufacturing changes from mass-production to tailored production enabling industry to locate almost anywhere. More 4IR can also be used to create clean, healthy, and productive lives for all, surrounded by Nature even in high density living, and to create villages that provide the good life of the city.

The changes to spatial planning for adaptation to climate change create a new discipline, though some cities have worked on ways of reducing the impact of rising sea-levels by coastal development that creates massive polders. Of increasing concern are the changes needed in the rural sector due to change in climate. But there are so many ways 4IR can assist:

- In identifying land-use threatened by climate change and identifying land-use that is a threat to climate change;
- In modelling the impact of land-use change proposals (see more below on flood control) and evaluating alternatives;
- In monitoring land-use changes (see more below on forests);

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[4] ISO 14064 standards for greenhouse gas accounting and verification published in 2006 and the Greenhouse Gas Protocol (GHGP)

- In modelling transportation, especially of goods, and use the modelling to control traffic and congestion;
- In modelling the greenness of cities and the condition of city gardens;
- In improving effectiveness of work from home;
- And so on.

Project Management

Almost all areas of mitigation of problems caused by past industrial revolutions require management of projects:
- Infrastructure projects;
- Software projects;
- Government reform projects; and
- Projects for implementing changed practices.

And the practice of project management is undergoing substantial change because of 4IR:
- Smart contracts are simply programs stored on a blockchain that run to implement automatically parts of contracts when predetermined conditions are met. They save time, reduce disputes, and assure transparency in project implementation.
- New material and fabrication technologies are increasing fabrication times.

Discussion

Will 4IR harm nature more or less?

High computing capacity and Big Data are creating enormous change in societies and economies throughout the world. The popularity of social media and the power of 4IR for business and government have spurred this change. But the dark side is also becoming apparent. George Orwell in his novel *1984* wrote that "Big Brother is Watching You" (Orwell, 2021). Now that we all have cameras in our pockets that connect to the Internet; almost everyone can be a Big Brother to watch almost anyone.

Google tells us the fastest route to take on a journey by detecting everyone with a handphone going along every possible alternative route we might take. Face-recognition software can help catch terrorists, and it could also let the world know who attended every Bali United football match last season, and who didn't.

4IR is already used as a means to undermine democracy, as we have seen in recent elections in the USA and UK. There is a real threat that 4IR will be like previous technologies, a means of worsening our ability to live together with Nature under increasingly trying circumstances. We must be on guard to assure that it is used to bring peace and prosperity to all.

4IR can be used for good. In Indonesia there is rampant illegal logging, fishing, and mining while misusing technology, and 4IR is already helping Indonesia to control them.

From things to do to things to be

Many people demand action. School children at demonstrations around the world are telling us older folks that something must be done. But many people are taking action, especially here in Bali. There are the Transformers, Bali Clean and Green, Bank Sampah, clean-up days, reclamation bans, plastic bag bans, and more.[5]

Thing are beginning to change because people are taking action and making plans for more. All this is very good but scientists are saying it is too slow to prevent the coming retribution of Nature. We need a cultural shift in the whole of Balinese society, the whole of Indonesian society, and the whole of global society, from being what we are to becoming something new – being and thinking and behaving differently – believing that the way we have been using technology is wrong, and becoming citizens committed to correcting our relationship with Nature and using new technology right.

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[5] Desa Penglipuran in Bangli has been recognized as one of the cleanest villages in the world. https://www.sewamobilbali1st.com/desa-penglipuran-bangli-bali/desa-penglipuran-bangli-bali-jalan-turun/. Accessed December 19, 2022.

Howard Gardner's Levers of Change and Minds for the Future

Howard Gardner (2004) in his book *Changing Minds, the art of changing your own mind and the mind of others* presents seven levers that can be used to create change for ourselves and others. I make notes on some of them:

- *Real world events.* Gardner illustrates how events like wars and economic crises have motivated major changes in the past. Scheidel (2017) says only catastrophe has curbed social inequality in the past. But now we are making the threat of disaster a lever of change. The strikes of Greta Thunberg and the school kids are already a real-world event that is demanding change because of the threat (see also O'Connell, 2018).
- *Research and Reason.* Scientists in the 1960s started detailed research on climate change, and the volume and refinement of that research grows every day. Especially since the 1980s, lobbyists have used reasoning to advocate action. Both research and reason are important to help people understand, but as climate change deniers are not persuaded by the research or the reason, research and reason have not yet become the essential lever of change. Research and reason are less levers of change than the basis of designing the changes we need.
- *Resonance.* Gardner gives examples of how getting together with like-minded people amplifies our calls for change. We saw the growth of resonance from Greta, one schoolgirl demonstrating, one a week, now arousing millions of voices around the world demanding change to address climate change. Resonance is a massive driver of change.

Naomi Klein's This Changes Everything

Naomi Klein (2014) argues in *This Changes Everything* that the changes should be viewed as a kind of gift — a catalyst to transform broken economic and cultural priorities and to heal long-festering historical wounds. She says: *"Forget everything you think you know about global warming. It's not about carbon—it's about capitalism. The most profound threat to humanity is the war our economic model is waging against life on earth"*.

I don't blame capitalism, I blame the capitalism we have. I agree we need "bold, roots-up action . . . to fight for our lives while there is still time" (Klein, 2020). She is proposing action that will change society and economy to something new. She points the way for society and the economy.

I want to start looking at how public administration should change.

Singapore and Surabaya

Back in 1999, the officer in Surabaya city government's development planning agency in charge of spatial planning was Tri Rismaharini. She asked me what was wrong with Surabaya that it could not be like Singapore, which was so clean and so green. I said, Lee Kwan Yew appointed the best people he could find in the whole world to lead spatial planning and Surabaya needs the best people for the job. She went on to study urban development and paid close attention to the advisers that the World Bank and others brought in to advise on garbage collection, traffic management, and flood control. She was made head of gardens and garbage and solicited support from business and media to create the original Green and Clean movement in Indonesia. She waded in canals to join the community in cleaning them, she planted streetscapes and landscaped gardens. She has been recognised as the world's best mayor. In September 2019, she addressed the United Nations on climate change and plastic garbage (Kumparan, 2019), and now she is Minister for Social Welfare. Risma is a living example of Gardner's principles to lever change.

Where Bali and Indonesia have a natural advantage

But where does this take public administration in Bali and Indonesia? Many issues of both 4IR and our link with Nature are beyond the scope of the government or people in Bali or Indonesia. Bali is a small player, even within Indonesia. But the government and people can declare and promise not to use 4IR against the people, and demand it be used fairly for the common good. And Bali and Indonesia can act in the international drama to address both Nature's retribution on our misuse of past technology and 4IR's potential to change it. Let us first look at where Bali and Indonesia have a natural advantage to help us find the changes we can most readily make.

Bali has a culture that appreciates balance with Nature, even though it has been neglected. It has a strong civil society that provides support, leadership, and training for public change in dealing with plastic waste. We now need more action from government leaders and entities, and when they provide it, the people will resonate with

them. Penglipuran is proof of this. Its village leaders have inspired the whole village community to make villages so clean.

Bali has a Governor with good intentions, committed to change, though he is careful that he does not lose his political base. As that base becomes more prepared for change, he will lead it. Bali has a green energy policy. They are not getting far yet with implementing it, but it is a commitment.

Bali has remarkable international support, from permanent residents like me and environmentally aware tourists, and it has a potentially unlimited support from the growing international climate change movement.

The whole of Indonesia is surrounded by sea. On the day before Nyepi, the first day of the Balinese new year which is celebrated with a total stop of economic and social activity, the Balinese bring their spiritual objects to be cleansed in the ocean, a symbol of purification so that the universe and the people live in peace and harmony. Three months after the birth of a child it is brought to the beach to be blessed by washing in the sea. This belief can be the basis for the Balinese for a movement to stop treating the ocean as it does now. As New Zealand has branded itself as clean because it is surrounded by the ocean far from anywhere, so Bali and Indonesia can do the same, using the ocean as a symbol of cleansing and promoting a clean lifestyle.

Indonesians are highly adaptable. They have adapted well to *reformasi* and *demokrasi*. They have learnt to respond quickly after disaster. They have a level of national pride in their unity in diversity, making it easy for them to address new ideas and new identities. And Indonesia has a remarkable level of bio-diversity, making it a potential focus for research needed to help us understand climate change and respond to it.

What does this mean for politics?

Indonesia has a President committed to change. But national and local politics are not so committed. Politicians need to be sure of their political base, so they are not likely to be as assertive about change as the pro-environment activists. We need to do more than oppose them; we need to help them change. This is clearly a core duty of senior civil servants. Senior civil servants should be abreast with the science of climate change and other environmental issues, and capable of presenting leaders with clear advice on introducing change.

What does this mean for Public Administration?

Of all that could be said about change in public management, I only present two propositions here. My main intention is to encourage the IIAS community to get more involved in promoting the use of new technologies to address the problems of old technology.

Competence to advise and adaptability

The most urgent task of senior public executives is to understand the science, and the gap between the science and current policy. And then to find the reasoning to present to political leaders for change. This needs two actions I present in my first proposition:

Proposition 1. Training and selections
I propose that the public administration academic community should develop focused training programs based on good research, for senior executives and middle-ranking executives to convey the science of the major threats from nature caused by human behaviour, and the opportunities 4IR presents to help address them within their portfolios. Then we can reasonably add such understanding to the criteria for senior appointments.

Project Management

Dealing with all the problems caused by past misuse of technology will result in very many projects, and more and more of government will be focused on project management.

Brody Boland et al. (2021), in a very recently released study from McKinsey Sustainability and C40 Cities have listed 15 key strategies for cities to address climate change. All are projects. But there is no mention of the change to public administration or the advances in project management enabled by 4IR.

In the track on disaster risk management at the 2019 IIAS conference in Singapore, we had papers about disaster risk reduction and disaster recovery, leading to discussions about the differences in public

administration. I summarised these differences in a paper later that year (Podger 2019), noting especially the need for adaptability. Then in 2020, I presented a paper to the track on resilience in which I noted how readily governments and executives have been able to adapt in dealing with Covid-19 (Podger, 2020), but questioned whether this would mark a change in behaviour required for either disaster risk reduction or for disaster recovery.

Changing government performance will also require projects to manage the change. And 4IR can help us manage them.

Proposition 2. More attention to project management
I propose that the IIAS community collaborate with the international project management community to investigate how trending project management technology can help public administration tackle the problems of nature's retribution because of our misuse of past technologies in war and espionage, combustion and traffic, rubbish and plastic, and urbanisation.

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