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Framing a "Wicked" Debate: Subsistence, Nutrition, and Indigenous Rights Versus Deforestation, Air Pollution, and Climate Change

by Cynthia Fowler, Wofford College

PLURAL PERSPECTIVES

This presentation considers anthropogenic environmental change as a wicked problem in which multiple, divergent understandings of complex systems and changing conditions coexist. The stakes are high with this wicked problem for the whole Earth and all of humanity. Stakes are especially high in the tropical agropastoral communities whose resource management systems are the subject of much consternation and, at the same time, whose systems are incompletely known.

As the pursuit of scientific understandings of global change has proliferated, conversations about human contributions to planetary change have become increasingly politicized in certain communities, such as the Indonesian government, while in other communities, such as Kodi, ecological dynamics are less politicized. Although this may result in further politicization of indigeneity and climate, I frame the content of conversations about anthropogenic environmental change on Sumba as a debate. The parties in the debate are not directly addressing one another and are not necessarily even aware of one another's perspectives. As an anthropologist, though, I see the plurality of opinions and make it a subject of study. At one end of the spectrum in the indigenous fire ecology debate is the opinion of landscape burning as an essential practice for managing subsistence regimes, acquiring adequate nutrition, and exercising self-determination. At the other end of the spectrum is the view that sees peasant fires as causing deforestation, air pollution, and climate change.

In this specific debate as well as in the wide-ranging domain of debates about the causes and effects of climate change, controversies over indigenous fire ecology are especially problematic because the survival of individual persons and ethnolinguistic collectives are at stake as are their meaningful landscapes. The integrity of life on Earth too is at risk. This presentation confronts the high stakes, wicked problem of anthropogenic planetary change (Xiang 2012) by casting the sides in this debate as ontologies and by exploring the existence of multiple knowledges about anthropogenic environmental change.

Social scientists recognize the coexistence of multiple, disjunct perspectives about indigenous fire ecologies across cultures. In his forthcoming article in the *Journal of Ethnobiology*, James Welch opens his paper with a succinct statement about this discourse in *his* field site: "Xavante (A 'uwẽ) hunting with fire in the cerrado landscape of Central Brazil has garnered considerable attention by the public for its purported threat to the environment and by the scientific community as an example of responsible indigenous landscape management" (Welch forthcoming:n.p.).

Plural knowledges about the causes of climate change circulate in a context of global inequities in the capacities of communities to cause global warming, and their unequal exposure to the effects of climate change as well as inequalities in people's abilities to adapt to change. This paper approaches a more complete understanding of the contributions of indigenous fire ecologies to global warming by displaying emissions data at the global and national levels and by describing fire regimes at the local level in the Kodi region of Sumba Island in Eastern Indonesia. Yet, not only do I not resolve *any* wicked problems in this presentation, I *encourage* attention to wickedness because it provokes issues we must discuss.

While many factors play into the complex human dimensions of global change, an especially powerful topic to focus on is fire ecology because it highlights, if not exaggerates, how wide the gaps can be in the ways people from different social groups can perceive the same landscape and the same change processes.

Socio-environmental change on Sumba is wicked because of divergent perspectives among Earth's stakeholders, and also for several other reasons: we have an incomplete understanding of Sumbanese conditions, climate change has variable causes and effects, conditions have always been and will continue to change, and solutions to climate change conundra could require risky tradeoffs.

To offer some resolution to the wickedness of human-fire-climate couplings in the context of incomplete science is challenging because most of what we need to know is unanswerable at the present time due to the lack of empirical evidence. The more feasible goal at this juncture, then, is to describe the wickedness of global warming and indigenous fire ecologies by answering a few questions that are [somewhat] answerable [sort of…but not really]: How do Sumbanese and non Sumbanese perceive socio-environmental change on Sumba? What are the contributions of agriculture to emissions of global warming gases? What types of and how much emissions do agricultural fires produce? What types of agropastoral fires occur on Sumba? What are the socio-environmental changes occurring in Sumba's agropastoral communities?

INCOMPLETE UNDERSTANDING: SCALE BIAS

Agriculture, globally, is the source for 14-22% of global warming gas emissions (Figure 1). 80% of CO2 globally comes from industrial activities while 20% comes from land use. Globally, agriculture constitutes almost half of methane (CH4) and nitrous oxide (N2O) emissions, and these emissions increased by 17% between 1990 and 2005 (Smith et al. 2007).

Emissions from agricultural land use arise in croplands, grasslands, forestlands (FAOSTAT 2014), and in and around homesites. Organizations such as the IPCC, FAO, EPA, and Global Emissions Fire Database (GEFD) provide easy access to abundant data for global, regional, and national land use emissions. Data on land use emissions at the sub-regional, sub-national, and local level are more difficult to obtain. Little data about the amount and composition of emissions is available at the island or sub-island level for Sumba. Data is lacking not only for Sumba, but also for additional locations in Equatorial Southeast Asia such as Central Kalimantan (Pete Vayda, Personal Communication). We could call upon ethnographic information to examine what is happening on Sumba in relation to the national and regional data. Two of the top three producers of methane and nitrous oxide in Indonesia from burning crop residues – rice and maize (Figure 6) – are important crops in Kodi, for example, in terms of hectares devoted to production: rainfed maize followed by rainfed rice, flooded paddy rice, and cassava (Figure 7). We cannot go much further, though, to assess the contributions of local level practices to global warming. The exercise of pairing emissions figures with ethnography would not provide us with any actual information about amount or composition of emissions.

Let's try again. Two major types of agricultural burning on Sumba (that are also measured by the IPCC, FAO, and GFED) include the **burning of crop residues** and the **burning of savannas and grasslands**. Asia contributed 50.5% to the global total emissions from burning **crop residues** (Figure 5). On the country level, Indonesia was the 4th top emitter in the world of CO2eq from biomass removal and burning in forests, grasslands, and croplands between 1997 and 2012 (Figure 13). CO2eq emissions from burning crop residues in Indonesia in increased

between 1997 and 2011 (Figure 8). The figures for Asia and Indonesia contextualize the data for Sumba, but we remain unable to comment on indigenous fire ecology in this regard.

This issue with the state of science points back to a wicked element of the climate change problem: the data we need to accurately answer compelling questions about anthropogenic environmental change are incomplete. A scale bias exists: global, regional, and national level data are more available than local level data.

In another illustration of the problem of incomplete data, little to no data is available about the occurrence of lightning fires. Determining the ratio of lightning to human-ignited fires is therefore not currently possible, nor is an evidence-based judgment of anthropogenic environmental change via fire.

What we do know is that fire is pervasive across the island. Human-ignited fires define Kodi's fire regimes. In other words, people mostly determine fire seasonality, frequency, intensity, and severity, fuel, and spread. Still, fire regimes vary temporally, spatially, and at different scales from the household to the hamlet, village, district, and the whole island. Overall, The diversified agrarian system in Kodi has temporally and spatially variable effects. Spatially, the effects of Kodi activities on the landscape are not uniform since people engage in multiple forms of production which operate in particular land cover types: horticulture in croplands and settlements; agroforestry in forests; husbandry, hunting, and gathering in savannas, shrublands, and forests, as well as in gardens and near settlements. Temporally, people vary their productive strategies throughout their lives in response to personal circumstances, social dynamics, financial needs, structural forces, and ecological conditions, thus their involvement with land cover types varies. Variability is a wicked element in the problem of environmental change.

VARIABLE CAUSES and EFFECTS

Variability of fire regimes stems from biophysical conditions, such as differing climates: the western portion of Sumba where Kodi is located has a Tropical Monsoon (Köppen-Geiger Am) climate while the eastern and central sections of the island have a Tropical Wet and Dry or Savanna (Köppen-Geiger Aw) climate. Social, cultural, political, economic, and other circumstances are also sources of variability and pathways of change. Language is an example: the majority of Sumba's residents are indigenous peoples who speak one or more of the 5-27 languages or dialects in the Sumba-Hawu group of Central-Eastern Malayo-Polynesian languages. The range in number is so wide because of the lack of research on languages, which explains the lack of specificity on the number of distinct languages compared to the number of dialects. A second example of a likely source of variation in fire regimes is population density, which ranges from 28/km^2 in East Sumba to 97/ km^2 in [the former] West Sumba (Lansing et al. 2007).

A further wicked outcome of the variability in Sumba's complex socio-ecological systems is that fire-driven change has positive, negative, *and* mixed or benign impacts on people, depending on the particular factors we are examining and the methods we use to measure and model them. Consider three issues: first, predictions about future climate and weather in Indonesia, second the implications of climate change for global health in Indonesia, and third judgments about indigenous fire ecology on Sumba.

Looking at the national level of Indonesia, the hypothesized consequences of climate change on global health include a mixture of negative, positive, and benign consequences. Stories about the effects of climate change on global health are wicked; i.e., complex conundra

with no simple solutions. Fossil fuel consumption is a major producer of the gases that cause global warming, yet it is associated with "huge improvements in global health and development over the past 100 years…fossil fuel energy has contributed to a doubled longevity, dramatically reduced poverty, and increased education and security for most populations" (Costello et al. 2009:1693-1694). The bind is how to weigh the tradeoffs when development produces more emissions but, at the same time, improves livelihoods and health with the addition of healthcare facilities as well as financially and logistically better access to healthcare.[11]

The double bind is that, as they modernize, communities may enjoy improvements in health at the same time as they emit increasingly greater amounts of greenhouse gases, yet increased development can have negative effects on health vis-à-vis global climate change. More transportation technologies leads to increased air pollution with potential respiratory consequences, potentially less exercise, and more injuries from vehicular accidents. Reliance on markets may lead to more emphasis on market production and less attention to subsistence production. These detrimental consequences are hypothetically true, at least, when generalizing across the globe.

Certain characteristics of Sumba's fire ecology contribute wickedness to the aforementioned problems of social variations in knowledge about environmental change. These characteristics are: 1) burning is illegal, 2) burning is an important crop production technique, 3) burning produces damaging emissions, 4) burning is culturally meaningful, 5) sometimes out of control fires damage property and harm people, 6) most fires are controlled, 7) fire frequencies are extremely high, and 8) most fires are low intensity. As we tack back-and-forth between the pros and cons of fire, the entanglement of technical estimations of the environmental effects of fire regimes with subject positionings relative to environmental governance becomes increasingly obvious. Adding more information about local fire ecology or indigenous culture *may* 'shed light on the situation' but it also complicates the story. Telling complex stories, full of multilevel socioecological data in the absence of tidy endings is an important role for anthropologists to play, though, and so that is what I do here in this presentation.

The ethnography of Kodi demonstrates that the same group of people in the same temporal interval and the same space can have positive, negative, *and* benign impacts on environments. Deforestation, reforestation, forest degradation, *and* forest protection, for example, occur simultaneously on Sumba. Thus, accusing Sumbanese of simply deforesting the island is not entirely accurate. Sumbanese are not merely only cutting trees and reducing forest cover. At the same time, Sumbanese are also planting trees and fostering agroforests. When and where people are reducing forest extent and decreasing forest health, the reasons are immensely complicated and tremendously difficult to resolve, basically because resolution would require massive restructuring of economies and risks to human survival.

While the consequences of indigenous fire ecologies are complicated, the causes of fires of various types are extremely fraught for many reasons. Here I mention one that doubles as an illustration of the politicization of fire in Indonesia Fires in Indonesia are known producers of the air pollution that poses problems for everyday citizens and major institutions (e.g., air travel) across Southeast Asia. 'Slash-and-burn' farmers have historically been blamed for starting the fires that cause the haze. Do smallholders' fires contribute to global warming and climate change? The short answer is 'yes' even though we do not know much about their contributions. We know their fires do not contribute as much as some observers believe or claim. The blame for regional smoke is somewhat misplaced. Researchers and investigators have found on Borneo and Sumatra that owners of and laborers on timber concessions and oil palm plantations who

start fires to clear land, sometimes illegally, are largely responsible for the peat fires that contribute more to Indonesia's national emissions than any other single cause (Bowen et al. 2001; Eaton 2001; Sizer, Stolle, Minnemeyer 2013; Vayda 2006). In numerous places, including Kalimantan, questions about who is responsible for destructive and high-emissions-producing fires are unresolved.

CHANGING CONDITIONS

In the Kodi region, the economy is mostly agropastoral and most emissions come from burning crop residues, burning pastures, clearing forests, and maintaining fires for cooking, light, and warmth. While Kodi individuals and households are integrating modernized technologies and new economic strategies into their lives, industries are limited to small and handicraft businesses. No medium or large industries are present in the region.

Fossil fuel consumption by Kodi agropastorlists is increasing is increasing, though. Since the beginning of the Reformasi in the last 1990s, the number of moped and motorcycle owners on Sumba has grown rapidly. Over the past 6 years, gas powered chainsaws have become accessible, and people are purchasing and using them to cut trees to build timber frame houses for themselves and for lumber to sell to consumers outside of the Kodi region. Household generators and well pumps are increasingly widespread fossil fuel technologies. Cars and trucks for transporting people and goods are now accessible to some of the wealthiest families. Entrepreneurs are selling gasoline in glass bottles at roadside stands. Governmental and nongovernmental organizations are operating numerous projects to achieve their 'development' agendas for the island.

A trend to develop a low carbon society/economy is proceeding on Sumba. The NGOs Hivos and Vestas, together with the Norwegian and Danish governments, and the Indonesian Ministry of Energy and Mineral Resources are working together to reach 100% dependency on renewable energy island-wide by 2025. As part of their "Wind for Prosperity" project, Vestas will donate V47-660kW turbine to Sumba, which they claim will, together with other energy production devices, reduce diesel combustion from gasoline generators by 500,000 litres per year and CO2 emissions by 1000 tons per year on Sumba (Vestas 2014). In 2014, Panasonic donated 111 solar lanterns to Sumba Islanders as part of the worldwide "Cut Out the Darkness" campaign. The 2 NGOs Kopernik and PELITA Sumba teamed up to collect donations to deliver solar lamps to Sumba, which PELITA sold to islanders. A new solar farm is operating in the North Kodi subdistrict, near the hamlet of Mogha Kawongo in Kodi.

Conditions have always been and will continue changing in every regard: with the climate and weather, political economy, society and culture, and land use and land cover. Climate scientists are more prolific in predicting changes in and the future conditions of the climate and weather, land use and land cover than social scientists are at predicting the directions political economies, societies, cultures, and technologies are heading. Perhaps anthropologists shy away from predicting the future because predictions are wicked. Climate change predictions are wicked, certainly, for many reasons, including because they vary and because of the difficulty of judging whether the predicted changes are positive, negative, mixed, and/or benign. Furthermore, the wickedness of climate change predictions leads to the tremendously wicked uncertainty about the causes and effects of anthropogenic factors.

RESOLUTIONS REQUIRE RISKY TRADEOFFS

When anthropologists document anthropogenic environmental change, we risk attracting blame aimed at the subjects of our research. Anthropology as a resolution may require risky tradeoffs. Reporting on pervasive fire use (even while low intensity and small burn area) and ongoing deforestation (even while small scale) in Kodi puts already politically economically marginalized, climatologically vulnerable people at further risk. Is the tradeoff we/I make by serving data to the world worth threatening the self-determination of Kodi since information about anthropogenic change could be misunderstood and politicized?

So to conclude, we revisit divergent perspectives (that first element on our list of wicked problems), this time to use the theme of our AAA session to push forward our ability to, as Sarah Strauss wrote in the original session abstract, "use our collective knowledge to build a more sustainable world," (Strauss 2014, post on Climate-change-anth listserv). How do we reconcile the discrepant opinions held by people occupying radically different subject positions? Taken together, we can we can find culture in the dialogue, and set our aim on understanding dialogic dynamics among collectives or, perhaps, *the* human collective.

What is shared in this multiplicity of knowledges, to refer to Latour's "theoretical exercise [of] reassembling a shared but plural world" (Salmon and Charobonnier 2014:570)? Can anthropologists reassemble shared and plural knowledge for use in constructing a sustainable world, to combine Strauss and Latour's objectives? Participants in the indigenous fire ecology debate occupy diverse, shifting subject positions and act upon complicated, sometimes contradictory knowledge, yet we share a future as inhabitants of one planet and thus form a collective. A resolution to the debate over whether indigenous fire ecologies are 'good' or 'bad' may be "unattainable" (Xiang 2013:1), and thus we find that climate change as a social issue is wicked.