

References

- Aryawan, I.G.N., I.N. Wiadarta, Y. Suzuki and F. Nakasujii (1993) 'Life Table Analysis of the Green Rice Leathopper, *Nephotetix virescans* (Distant), an Efficient Vector of Rice Tungro Disease in Asynchronous Rice Fields in Indonesia'. *Resources and Population Ecology* 35: 31–43.
- Helmreich, Stefan (1999) 'Digitizing "Development": Balinese Water Temples, Complexity and the Politics of Simulation', *Critique of Anthropology* 19(3): 249–65.
- Lansing, J. Stephen (1991) *Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali*. Princeton, NJ: Princeton University Press.
- Lansing, J. Stephen (1999) 'Anti-Chaos, Common Property and the Emergence of Cooperation', in Timothy Kohler and George Gunterman (eds) *Dynamics in Human and Primate Societies: Agent-Based Modeling of Social and Spatial Processes*. Santa Fe, NM: Santa Fe Institute and Oxford: Oxford University Press.
- Lansing, J. Stephen and James N. Kremer (1993) 'Emergent Properties of Balinese Water Temple Networks: Coadaptation on a Rugged Fitness Landscape', *American Anthropologist* 95(1): 97–114.
- Lansing, J. Stephen, Vanda Gerhart, James N. Kremer, Patricia Kremer, Alii Arthawiguna, Supripto, Ida Bagus Suryawan, I Gusti Arsana, Vernon L. Scarborough and Kimberly Mikita (in press) 'Volcanic Fertilization of Balinese Rice Paddies', *Ecological Economics*.

Power/Networks

A Rejoinder to Lansing

Stefan Helmreich

New York University, USA

In 'Foucault and the Water Temples', Steve Lansing (2000b) argues that my critique of his simulation work on Balinese water temple networks (Helmreich 1999) misses crucial points about the premises and politics of his computer models. I welcome his reply and the opportunity to exchange views on this matter. This rejoinder reiterates and qualifies my primary argument – that Lansing mutes politics at key moments in his simulation model and in his presentation of it – and also responds to some of Lansing's new discussion. Ultimately, I hope to channel my comments here toward accenting our shared concerns about the issues at stake.

My principal contention in 'Digitizing "Development"' (Helmreich, 1999) was that Lansing's depiction of water temple networks as 'complex adaptive systems' in the simulation models he created with James Kremer collapsed cultural and historical processes into an evolutionary language that compressed human agency into an ahistorical biologicistic idiom. And I maintained that this risked rendering a sociohistorical process as a natural process friendly to technical representation, potentially making Lansing's simulation vulnerable to appropriation into the technocratic epistemology that underwrote the Green Revolution, a political project for which Lansing and I share strong disapproval. Lansing suggests that I have misread his work historically as well as politically.

Foucault, power, and partitioning 'traditional' and 'modern' rationalities

In *Priests and Programmers*, Lansing invokes Foucault to argue that 'power' in Bali exists as a "complex strategical relationship" between the symbols of the flow of holy water and the pragmatics of irrigation, something that has been invisible to Eurocentric social theory (1991b: 130). Given that Foucault's arguments were primarily about the constitution of power as a productive force in modern European contexts, however, we might initially suspect that Foucault could prove more useful in understanding how

**CRITIQUE OF
ANTHROPOLOGY**

Vol 20(3) 319–327 [0308-275X(200009)20:3; 319–327/013847]
Copyright 2000 © SAGE Publications
(London, Thousand Oaks, CA and New Delhi)

European colonial power reconoured this “‘complex strategic relationship” in Bali. But Lansing cautions that water temple networks were largely invisible as irrigation institutions to 20th century Dutch colonialists, who persisted in attempts to revive an imagined ‘hydraulic bureaucracy and [who] argued that in so doing they were merely restoring an ancient system that had fallen into decay during the nineteenth century’ (1991b: 35). Such efforts, based on misrecognitions of Balinese institutional systems, actually had negligible effects on the integrity of water temple networks, which continued to function even in the face of attempts to reorganize irrigation along hierarchical lines.¹ Lansing argues that ‘When the Dutch organized the construction of entirely new systems, presumably the temple system would have functioned to redefine water rights and cropping patterns’ (1991b: 102). Lansing draws on this historical accounting to warrant his extraction of ‘traditional’ water temple dynamics from the messiness of colonial and postcolonial eras.

But even as Lansing advances this account, he also offers suggestive hints that European power may have had nontrivial effects on temple systems. He shows how the Dutch at the turn of the last century created new kinds of bureaucratic units and roles and tried to force the category of *soewinih* – ‘a form of contribution to water temple festivals’ (1991b: 31) – into the centralized frame of a ‘royal irrigation tax.’ He reports that this attempt effected only a minimal disturbance in the system, but his report of a 1980s dispute between two water temples about which might be considered the legitimate collector of *soewinih* – a postcolonial example he offers as illustrating the ‘the politics of *soewinih*’ (1991b: 106) – suggests that there may be a few ripples from these earlier perturbations. At the very least, this example makes Lansing’s broader contention that ‘For the Balinese, irrigation is a religious matter, outside of politics’ (1991a) difficult entirely to accept.² In her ethnography of Balinese communities and the Indonesian state, Carol Warren points us to one example of how indigenous agricultural practices have been networked into colonial and postcolonial politics. She writes of a *subak* (agricultural association) in which the head ‘had been installed in office by the Dutch with the construction of a dam in the area and the irrigation system’s integration into the government Public Works Department network in 1941’ (1993: 105); this arrangement continued after the end of the colonial period with the result that ‘close ties to the bureaucracy in Subak Celuk skewed the exercise of authority away from the control of the members’ (1993: 106). I offer this story as suggestive of the imbrication of ‘traditional’ irrigation practice with ‘modern’ state activity.

But of course we must be careful not to read too many assumptions about the politics of co-optation and resistance into this different context. Lansing identifies an important misapprehension in my analysis – one he locates as following from my trust in A.J. Michael’s summary of his work – namely, that water temple priests are often high-ranking Brahmans.

Lansing sets the record straight: ‘Brahman priests have no authority or role whatsoever in irrigation management in Bali.’ Here I certainly defer to Lansing’s ethnographic authority. Nonetheless, the general point I wished to make did not so much rest on the Brahman status of the water temple priest,³ but rather on the possibility that the power of this priest may be entangled with state and international structures not entirely in tune with the practices of Balinese rice farmers – something suggested by Lansing’s narration of the ways state irrigation officials (*sedahans*) often answer both to Balinese ethnic loyalites (and therefore the authority of water temple priests) and the exigencies of the state organizations by which they are employed (see Lansing, 1991b: 79–80 for recent history and 1991b: 98 for a colonial example; and my summary: 1999: 257).⁴ Since I am not an Indonesianist, I take Lansing’s word that reading these interactions as dynamics of co-optation may not do justice to the complexity of the situation. Nonetheless, I am led by Lansing’s own narrative to wonder whether his attempts to isolate and restore a ‘traditional’ system may not be swamped by the thickness of Balinese history. Early in *Priests and Programmers*, Lansing poses conflicts between water temple priests and the state as a ‘contest of rationalities’ (1991b: 16), but minimizes the extent to which these rationalities may have hybridized – and done so at several different scales with effects for the integrity of the water temple system, even before the Green Revolution radically destabilized the whole system.⁵

Can history and ecology be separated?

This brings us to the first of my central arguments: that the simulation leaves out key aspects of history and that this may matter for understanding how temple networks function. Lansing recognizes that variables attaching to the recent history of Bali are left out of the simulation but submits that these are not relevant to the questions he is addressing. He maintains that the simulations ‘don’t attempt to capture historical reality,’ but rather the logic of an ecological practice. Fair enough. In the ‘Anti-Chaos’ article Lansing cites in his reply to me, he argues that the simulation is meant to ‘illuminate the *driving forces* behind a particular historical process’ (2000a: 210, my emphasis). The simulation thus rhetorically separates these driving forces from the history they are supposed to animate. But insofar as these forces are both ecological (e.g. the proliferation of pests and the flow of water) and social (e.g. the decisions of subaks), and insofar as each force provides the locally irreversible constraints for the other according to Lansing’s account, it would seem that they cannot be so easily disengaged from history.⁶ That the simulation should be written as though they can is curious given that Lansing argues that understanding irrigation practices requires us to see them as constitutively social – indeed as ‘sociogenic,’ a term which refers to ‘the ability of ritual to bring forth, define, and empower social relationships

in the context of the productive process' (Lansing, 1991b: 15). The ahistorical idealization of water temple networks goes against a point Lansing is actually at pains to highlight – that ecologies have been transformed by productive processes over centuries and don't look now the way they once did. As Lansing puts it, 'The water temples are a social system that manages production, not a ritual clockwork' (1991b: 123). And 'Each year is not identical to the last, for over the course of many generations the primeval landscape of forested hillsides has been transformed into a productive system of terraces, tunnels, and irrigation systems' (1991b: 12). My point in inquiring after recent historical events in Bali was to ask whether such events as Suharto's violent rise to power might not have reshaped the ways rural organizations, networks, and hierarchies functioned (something suggested by Robinson, 1995) – a fact that may complicate Lansing's separation of ecology from history and his reconstruction of a system that has worked for 'over a thousand years' (Lansing and Kremer, 1993: 97).

Ecology, evolution, and visions of nature

But let us for the moment accept the premise that the particulars of 'history' are not germane to the model, and that they might be unambiguously bracketed for the purposes of getting at an underlying ecological dynamic. We must then face the question of why we should accept the idea that the model speaks to the actual 'evolution' of water temple networks (Lansing and Kremer, 1993), since evolution is a process that unfolds over time in response to historically specific and unrepeatable contingencies that leave each iterative moment uniquely different from the last.

This brings us up against Lansing's very interesting argument in *Priests and Programmers* about history and the Marxian inheritance of much cultural ecology. Lansing maintains that Marx's vision of 'history' as a process of 'humanizing nature' depends on a commitment to a linear, progressivist vision of the cumulative effects of human labor on the material world, a vision linked to the larger evolutionary and modernist mood of Marx's period. Lansing persuasively argues that this view is Eurocentric and does not entirely make sense in Bali. According to Lansing, even if Balinese water temple networks materialize cumulative sociogenic change, they are not seen by Balinese as reflecting 'progressive linear order', but rather as symbolically calibrated to such temporalities as the lunar synodic period or the growth of rice plants. Lansing argues that this is a 'biological view of time' (1991b: 12) corresponding to 'cycles of nature' (1991b: 133) and one which might usefully be understood as akin to Western scientific models in which 'time measures the duration and analysis of periodicity' (1991b: 161, note 27). This is the analogy that inspires Lansing to consider a simulation of the water temple system which brings together Balinese and contemporary Western scientific models of time.

But something has slipped here, like Marx, Lansing is using a culturally specific scientific account of 'nature' – that 'biology' he identifies with the iterative dynamics of 'complex adaptive systems' – as a universal grid against which to describe cultural practice. Lansing objects that my analysis of this move flattens the Balinese cyclical temporal consciousness he is trying to describe into the very orientalist stereotype I discern in his description. But my primary objection is not to his identification of cyclical temporal ideas as such, but to the alignment of these with 'biology' and 'nature.' It is not clear why 'nature' should be such a stable referent that Balinese and Western scientific conceptions of it should converge so neatly. Lansing argues that 'water temples inhabit a world that is largely outside the domain of social theory as it is presently constituted' (1991b: 8). Why then should they fit so cleanly into the present domain of theory in the sciences of complexity? As Lansing himself points out, meanings of 'nature' are historically various, and indeed, should we wish to use this category to understand Balinese irrigation practices, we will find its boundaries and dynamics to be quite different from those in Western societies (1991b: 12). Following Lansing's intriguing parochializing of 'humanized nature' further, however, we might question the nature/culture distinction itself, rather than transport it into analysis of this different milieu (see Strathern, 1988).

This is to say that a culturally particular vision of 'nature' persists in Lansing's model, one that calls upon 'fitness' and 'adaptation' as iteratively realized features of 'complex adaptive systems' and uses these terms as universal concepts through which individual and social human agency might be funneled – especially by figuring such agency in the cost-benefit logic of game theory (this language is not so apparent in Lansing's reply to me, but features prominently in his other writings). Lansing writes, for example, of 'farmers engaged in iterative games with nature' (2000a: 221) and suggests that this gaming agency – which is the agency the simulation encodes – captures reality since 'the best model is not necessarily one that comes closest to predicting the behavior under study but rather one that captures and illustrates the underlying dynamics driving the behavior' (2000a: 209). Lansing here makes the claim that he knows the real reasons that water temples optimize rice harvests and that these reasons reside in the adaptive logic of the system as a whole, a logic underwritten by the rationality of 'fitness payoffs', and a logic unavailable to the consciousness of farmers' organizations even as they enact it: 'Luckily for the subaks, the mathematics of complex adaptive systems are such that this ill-informed collection of strategies is all that is needed for them to rapidly climb the foothills of their local adaptive landscapes' (2000a: 220). I submit that there may be other not-so-neatly ecological strategies in motion here. Just one example: Ayami Nakatani has suggested that Balinese farmers may prefer 'traditional' methods in part because they 'enable the cultivation of profitable secondary crops after the rice harvest – chilies, garlic, and shallots, for example,

which can be easily transported to the major markets in Semarang and Denpasar' (1999: 206). This complicates the idea that the 'underlying dynamics' of water temple networks answer only to ecological feedbacks.

Computers in context

My final point of critique, which Lansing accurately summarizes, is that simulation tools may be placed in contexts that do not dismantle Green Revolution power structures. Arguing against this contention, Lansing maintains that his simulations 'don't provide tools for the powerful to control the weak; instead, they illustrate why a bottom-up system of control procedures produces better harvests for everyone than centralized management.' But I must reiterate a primary point here: illustration is not the same as use; simulations do not speak for themselves but must be routed into social networks in which their principles of interpretation can be actively reinforced at each step (see Latour, 1991; Hayles, 1996). The contexts into which Lansing and Kremer's simulations enter are, as Lansing himself notes, cross-hatched by hierarchy – and, indeed, by hierarchies that Lansing is invested in dismantling. His practice of crafting computer simulations that attempt to capture social-ecological dynamics while strategically leaving out history (even as they claim to illuminate evolution) is a tactical choice, one he hopes can persuade people in positions of power to abandon the framing and enforcement of harmful environmental policies.

In this connection, I think Lansing misreads my worry about the simulation getting into the wrong hands. My worry was not about simulations becoming a 'potential weapon in the hands of the powerful Brahmins who control the irrigation systems in Bali'; here Lansing has carried these imaginary Brahmins into his own argument. I wondered rather about the effects of sharing the simulation with people who were not farmers or priests, since such models may enter into networks well beyond local structures – in this case, networks that include international organizations like the Asian Development Bank that may wish to co-opt it for purposes other than those for which it was fashioned. Certainly, Lansing is aware of this possibility – one reason he has gone to such efforts to control how the simulation enters into political debates and personally to maintain the chain of interpretation from one context to another. Computer simulations as tools are quite different from *tikas*, those wooden or painted calendars used by Balinese farmers to synchronize their cropping schedules (Lansing, 1991b: 68), and they travel differently in the social and political world. The *tika* embodies a local knowledge that might be difficult to translate and transport to board rooms. The computer model leans on mapping practices that move more easily into elite circles – and, yes, in part because of its graphical interface, its association with modernity, and the speed with which computers can animate theoretical assumptions in a way that appears to disclose

an objective reality' (see Galison, 1997). I agree with Lansing that the representational appearance of a simulation must be distinguished from its content, and I thank him for calling attention to this important distinction, which did not feature prominently enough in my argument. At the same time, however, I still hold that a map-like simulation presented to state officials may be read for far different purposes and projects than those of farmers. I do not read Lansing's omission of this possibility as a sign that his work is ill-intentioned (much less 'morally deplorable', as he puts it in a locution that is too strong and that displaces questions of effects onto questions of intent), but rather that Lansing stops short of anthropologizing his own technological practice. His narration – if not his actual deployment – of the simulation relies too heavily on the assumption that his model transparently reveals truth.

In this regard, I found Lansing's closing stories about shepherding his simulations into new political contexts illuminating – exactly the kinds of tales I think are worth highlighting in these discussions. These illustrate the real political work it takes to make simulations become what Lansing argues have been 'persuasive tools.' And Lansing answers the important question of 'persuasive to whom?' as he tells us of speaking with and challenging international consultants for the Bali Irrigation Project and engineers of the BIMAS ('Massive Guidance') project. We might ask whether the simulation speaks as well to the concerns of other audiences, or whether other constituencies might simulate the processes differently. Or, indeed, as I asked in my original article, whether there is not danger here of enlisting Balinese farmers into a dependency on First World knowledge and technology that, while deployed to advocate for their interests at the moment, may also be used against them. These are of course open questions, and Lansing's reply has given me a more complex view of these matters. I do think Lansing has taken important steps to what historian and mathematician Ron Eglash (1999) has called 'participant-simulation'; the use of computer modeling in collaboration with people who have a stake in the dynamics under simulation. What needs to be kept in view is the fact that the simulation platform is itself a cultural artifact and cannot travel innocently from one site to another. My difficulty with Lansing's books and film presentation is his inattention to theorizing his simulation as a cultural object with peculiar principles of interpretation and with links to powerful technical, scientific, business, and international networks that may not always be on the side of indigenous farmers. I respect Lansing's keen practical sense of the power his models might have to persuade a technologically trained elite. I do not believe that the use of mathematics and computer modeling in social science is simply equivalent to positivism, but I do think that leaving simulation practice unexamined as a cultural and constitutively political activity may divert our attention from the complexities of advocacy anthropology in the digital age.

Notes

- 1 Lansing faults me for 'imagin[ing] an hierarchical system of irrigation control' much like the Dutch engineers, but this seems curious given that he writes that the 'flow of holy water from temple to temple establishes hierarchical relations between the temples' (1991b: 58).
- 2 Indeed, Lansing's narration of his own role in settling this dispute by presenting plans and photographs from Dutch colonial archives (1991b: 108) plays down the extent to which his presence might be used in the political strategies of his interlocutors – and not just in the name of historical truth, as he uses this example to suggest. In my opinion, Lansing similarly does not treat the polyvalence of his own presence as an outside anthropologist in his discussions of the reception of his computer simulation.
- 3 This priest nonetheless does have a quite exalted position and his 'permanent identification with the Goddess of the Lake sets him apart from all other Balinese priests' (Lansing, 1991b: 75) and often puts him in the company of Brahman high priests who sanctify holy water at important water temple rituals. Lansing writes: 'Like the Brahmans, the Jero Gde [the high priest of a water temple] is a kind of priest, who makes no claim to the temporal powers of a king' (1991b: 92).
- 4 Lansing argues that the government office of the *sedahan* is 'supposed to decide questions of water rights' but in practice doesn't always have irrigation maps and often seems more invested in maintaining the 'records of land ownership that are used to calculate taxes' (1991b: 80). Nonetheless, Lansing writes that 'government offices are staffed by Balinese, who live in a world of water temples' (1991b: 80) and he suggests that government power (in the form of the police or of the local regency) is sometimes called upon in quarrels over the water rights of subaks.
- 5 Such hybridities of rationality are suggested in Geoffrey Robinson's political history of Bali, primarily in discussions of complex taxation regimes put in place under colonialism, the structures of which 'implied much more than a simple exploitation of "the Balinese" by "the Dutch"' (1995: 58).
- 6 Especially since Lansing argues crucially that 'the ritual system of water temples defines the symbolic meaning of productive relationships' (1991b: 129) and that these allow the relationships to exist as such: 'The ritual system is not merely a gloss on productive relationships, for in the long run it is the social relationships constructed by water temples, not the mechanics of water flow, that create and sustain the terrace ecosystem' (1991b: 129–120).

References

- Eglash, Ron (1999) *African Fractals: Modern Computing and Indigenous Design*. New Brunswick, NJ: Rutgers University Press.
- Brunswick, N.J.: Rutgers University Press.
- Galison, Peter (1997) *Image and Logic: A Material Culture of Microphysics*. Chicago, IL: University of Chicago Press.
- Hayles, N. Katherine (1996) 'Narratives of Artificial Life', in George Robertson, Melinda Mash, Lisa Tucker, Jon Bird, Barry Curtis and Tim Putnam (eds) *Future/Natural: Nature, Science, Culture*, pp. 146–64. London: Routledge.
- Helmeich, Stefan (1999) 'Digitizing "Development": Balinese Water Temples,

Complexity, and the Politics of Simulation', *Critique of Anthropology* 19(3): 249–65.

- Lansing, J. Stephen (1991a) *The Goddess and the Computer*. Watertown, MA: Documentary Education Resources (60 minute video).
- Lansing, J. Stephen (1991b) *Priests and Programmers: Technologies of Power in the Engineered Landscape of Bali*. Princeton, NJ: Princeton University Press.
- Lansing, J. Stephen (2000a) 'Anti-Chaos, Common Property and the Emergence of Cooperation', in Timothy Kohler and George Gummerman (eds) *Dynamics in Human and Primate Societies: Agent-Based Modeling of Social and Spatial Processes*, pp. 207–23. New York: Oxford University Press.
- Lansing, J. Stephen (2000b) 'Foucault and the Water Temples: A Reply to Helmeich', *Critique of Anthropology* 20(3): 337–46.
- Lansing, J. Stephen and James N. Kremer (1993) 'Emergent Properties of Balinese Water Temple Networks: Coadaptation on a Rugged Fitness Landscape', *American Anthropologist* 95(1): 97–114.
- Latour, Bruno (1991) *We Have Never Been Modern*. Translated from the French by Catherine Porter. Cambridge, MA: Harvard University Press, 1993.
- Nakatani, Ayami (1999) "'Eating Threads": Brocades as Cash Crop for Weaving Mothers and Daughters in Bali', in Raechelle Rubinstein and Linda H. Connor (eds) *Slaying Local in the Global Village: Bali in the Twentieth Century*, pp. 203–29. Honolulu: University of Hawai'i Press.
- Robinson, Geoffrey (1995) *The Dark Side of Paradise: Political Violence in Bali*. Ithaca, NY: Cornell University Press.
- Strathern, Marilyn (1988) *The Gender of the Gift: Problems with Women and Problems with Society in Melanesia*. Berkeley: University of California Press.
- Warren, Carol (1993) *Ada and Dinas: Balinese Communities in the Indonesian State*. Kuala Lumpur: Oxford University Press.