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Sustaining Places: Sensibility Models as Decision Support Tools for Messy Problems

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Abstract: Methods for passing on findings of ecological research are well established; methods for passing on what is learned in environmental management are much less institutionalized, and much less comprehensive. In particular, questions that are less disciplinable are less likely to be investigated and the learnings shared. A key challenge is that the orderliness of knowing-how is not nearly as systematic as science, law or ethics. It is shaped by practical exigencies, and so is profoundly historical-reflecting tradition and experience. Felt understanding, researched through disciplined reflective practice, provides a valuable empirical opportunity. It is the layer of knowing-how that practitioners rely on (consider, for example, the importance that feeling uncomfortable in a negotiation has). Secondly, it is a window on the field of possibilities practitioners are considering, so it offers a wider lens on know how than research that focuses on what practitioners are observed doing. Thirdly, it makes complex practice skills such as acting simultaneously as scientist, politician and manager researchable. Decision support tools built from explicating felt understanding therefore better support flexibility and openness, and are better suited to scaffolding expert practice than, for example, documenting repertoires of procedures. They are particularly well suited to sharing expertise related to ‘messy problems’ encountered by sustainability practitioners. The ‘sensibility model’ explicated here is a proof of concept of an alternative way of researching know how, and supporting reflective transfer amongst sustainability practitioners.

Keywords: ecosystem management; planning; adaptive management; reflective practice; knowledge management; tacit knowledge

1. Introduction

In environmental management, learning from our efforts to sustain communities and ecosystems is critically important. Emphases on research, monitoring and plan-do-review loops underline this. However, how what we learn in one situation should guide action in another situation is much less settled than this emphasis on learning implies. Methods for passing on findings of ecological research are well established; methods for passing on what is learned in environmental management practice are much less institutionalized, and much less comprehensive [1–5]. This paper explores the potential of explicating practitioners’ sensibilities—their ‘feel’ for what may occur and what it may be helpful to do—as a way of making what practitioners are learning explicit and shareable in a formal way, providing a “paradigm for practice” that designs in contextual sensitivity [6], and supports “reflective transfer”—context sensitive sharing of learnings [7].

The situation in environmental management and other practice traditions which place a central emphasis on sustainability is not unlike that of nursing as characterized by Clarke and Procter [8] (p. 981):

“No-one would argue that practice development research is not a legitimate activity, and yet it is owned wholly neither by practice nor research environments since it sits slightly outside the parameters of each.”

Exploratory practice—experimenting with different approaches ‘in the field’—is at the heart of disciplined development of environmental management as a practice tradition. Some kinds of practice question have a good chance of being explored, e.g., those owned by ecologists and engineers [9–11]. Many others are less disciplinable, and so less likely to be investigated. For example, questions about how to act effectively to catalyze change in networks of stakeholders, in varieties of socio-political and socio-ecological circumstances, are harder to frame in a way that is both appropriately disciplined for researchers, and appropriately sensitive to the needs of practitioners.

Articulating practice know-how in a way that makes its standing clear as a disciplined understanding of practice situations is not straightforward [6,7]. This difficulty can be explicated in many ways. Schön [7,12,13] emphasizes contrasts between professional practice as we find it, in which “knowing-in-action” is central—knowing that we demonstrate as we act appropriately and effectively, that we don’t often reflect on, and which we often have difficulty articulating [12] (p. 54)—and “technical rationality”. Writing in 1983, he describes technical rationality as “the dominant epistemology of practice”.

“According to the model of Technical Rationality [. . .] professional activity consists in instrumental problem solving made rigorous by the application of scientific theory and technique.” [12] (p. 21)

There is a gulf between inarticulate skillfulness and rigorous application of scientific insight that is quite often read as proof of the weakness of practice know-how.

Forester [14] develops this contrast by demonstrating how poorly the metaphor of “design as a search process”—searching a space of possible solutions for the optimal solution—fits planning practice.

“Designing takes place in institutional settings where rationality is precarious at best, conflict abounds, and relations of power shape what is feasible, desirable, and at times even imaginable. By recognizing design practices as conversational processes of making sense together, designers can become alert to the social dimensions of design processes, including organizational, institutional, and political-economic influences that they will face—necessarily, if also unhappily at times—in everyday practice.” [14] (p. 121)

We make sense together (Forester [14] (p. 119), cf. Schön [13] (p. 101)), working from our tacit knowing-in-action (Schön [12] (p. 53), cf. Forester [14] (p.120)).

Brunner [6] (p. 136) explicates the difficulty of articulating practice know-how in a way that does justice to its knowingness by contrasting it with reductionist inquiry that “aims to reduce diverse observations to general relationships that predict new observations with precision and accuracy. He underlines that practitioners focus on practical problems in particular contexts, rely on “context-sensitive” methods, and recognize that their conclusions are for unique, open, evolving situations. Accordingly, Schön’s metaphor for generalization in practice traditions is “reflective transfer”—in each new situation, “one must still test the validity, actionability, and ‘interest’ [. . .] of the practice knowledge derived from the initial situation” [7] (p. 31). Brunner’s conclusion is similar to Schön’s. We need a new “paradigm for practice” (Brunner) [6]. We need a new “epistemology of practice” (Schön) [7].

The degree of orderliness that rich accounts of knowing-how can attain is an open question: one addressable through continuing efforts to characterize know-how accurately and helpfully. Shotter [15]—who like Gendlin [16,17] is very sensitized to the felt underpinnings of practicing—proposes “undisciplining” enquiry, and affirming the art-like character of skillful practice (which Schön [13] also points out):

“[T]o get clear as to what, precisely, is the difficulty we face in a particular situation, we must first arrive at an unified, hermeneutically-organized or dialogically-structured sense of the field of possibilities it offers us for making ‘moves’ within it. To repeat, as Dewey (1938/2008) put it, “a problem must be felt before it can be stated” (p. 76), and it must be stated in such a way that all involved in it can gain a feel for it in a similar manner, if it is to be investigated in an organized fashion within a thought collective. Doing this is an art. Why? Because our arts are to do with bringing novel and unique feelings into existence related to our current ways of being-in-the-world, and there are no pre-established rules, principles, or methods for doing that.” [15] (p. 76–77)

The explications of sensibilities offered here are supports for building a “hermeneutically-organized [...] sense of the field of possibilities” in one’s own particular circumstances. Shotter’s argument rests on a strong ‘general and disciplined’ versus ‘unique and undisciplined’ contrast. I suggest that—as Schön’s term “reflective transfer” implies—the orderliness and generalizability of know-how characteristically sits between these extremes. The advice of a skilled colleague who has worked in resonant circumstances is neither a template nor irrelevant. The kind of generalization that such explications offer is neither a guarantee of relevance nor a guarantee of accuracy: it is an explication of other practitioner(s)’ understandings of how particular kinds of situation may be helpfully approached. The limits of their experience and the limits of their expertise (unfamiliarity, lack of insight, misunderstandings, etc.) will always be in play, and the relevance of their experience to a reader’s always needs to be explored. A collective history of (often informal) exploration of ways of approaching situations shapes practitioners’ understandings, so expert opinion is not simply personal opinion. Explications of sensibilities may be relevant and may be helpful. Explicating practitioners’ sensibilities is a platform for conveying the partially disciplined [18] character of skillful professional practice.

1.1. Instabilities and Gaps

In the absence of a worked out epistemology or paradigm, what efforts to describe environmental management and other efforts to sustain places often produce is lists of features. For example, synthesizing a number of reviews of ecosystem management practice literature (Table 1), we can confidently assert that each of the following is an important theme in ecosystem management practice:

- Sustaining ecosystems
- Conserving biodiversity
- Supporting social and economic development
- Collaborating
- Scoping
- Systems analysis
- Adaptive Management
- Implementing
- Monitoring and evaluating
- Information management.

However, although we can confidently identify themes, beyond that there is considerable instability in the model of ecosystem management practice that this literature offers. Table 1 illustrates that in a number of ways. Although some terms are widely used (notably “collaboration” and “monitoring”), there is also considerable diversity in the features of ecosystem management practice that authors single out (see the ‘Terminology’ column). Differentiating principles, goals, activities, standards and tools, for instance, (see the ‘Framing’ column) is helpful. But the mapping of themes to these categories is not robust. For example, “recognizing the need for multi-sector collaboration” is identified by Pirot and others [19] as a “principle”, yet it could just as easily be seen as part of “collaboration”, an “activity” identified by Waltner-Toews and Kay [20]. Or again, capacity building

and information management are both identified as tools by Pirot and others [19], who consider the ecosystem management landscape from a strategic perspective. They could also be articulated as goals, or principles, for operational staff. Each theme has some relevance to each of principles, goals, activities, standards and tools. What crossing of themes and frames is appropriate depends on the practitioner's situation and intent.

Table 1. Describing ecosystem management.

Themes	Framing	Terminology	Pirot, Maynell & Elder [19]	Bengston, Xu & Fan [21]	Keough & Blahna [22]	Waltner-Toews & Kay [20]	Natural Resources Commission [23]
Sustaining ecosystems	Principle	Maintaining Ecosystem Functions and Integrity	x				
	Goal	Ensuring sustainability		x			
	Goal	Maintaining ecosystem health		x			
	Tool	Ecosystem-based management planning	x				
Conserving biodiversity	Principle	Maintaining biodiversity	x				
	Goal	Protecting and restoring biodiversity		x			
Supporting social and economic development	Principle	Recognizing People as Part of the Ecosystem	x				
	Principle	Making Ecosystem-based Management a Mainstream Development Approach	x				
	Characteristic	Heeding human dimensions		x			
	Factor	Economic incentives			x		
	Tool	Development activities	x				
	Tool	Capacity building	x				
Collaborating	Principle	Recognizing the Need for Multi-sector Collaboration	x				
	Standard	Opportunities for collaboration					x
	Standard	Community engagement					x
	Characteristic	Collaboration		x			
	Factor	Collaborative stewardship			x		
	Factor	Inclusive public involvement			x		
	Factor	Stakeholder influence			x		
	Factor	Consensus group approach			x		
	Activity	Collaboration				x	
	Activity	Seeking solutions: dialogue, negotiating, visioning				x	
Scoping	Tool	Participatory processes	x				
	Tool	Institutional coordination	x				
Systems analysis	Standard	Determination of scale					x
	Activity	Situation analysis: issues, stakeholders, governance				x	
	Tool	Environmental assessment tools	x				
Adaptive Management	Principle	Recognizing Ecosystem Boundaries and Transboundary Issues	x				
	Characteristic	Taking a systems approach		x			
	Activity	System description (analysis and synthesis)				x	
Adaptive Management	Principle	Recognizing the Need for Knowledge-based Adaptive Management	x				
	Principle	Recognizing the Inevitability of Change	x				
	Standard	Risk management					x
	Characteristic	Adaptive management		x			
	Factor	Adaptive management			x		
	Activity	Design adaptive approach				x	

Table 1. Cont.

Themes	Framing	Terminology	Pirot, Maynell & Elder [19]	Bengston, Xu & Fan [21]	Keough & Blahna [22]	Waltner-Toews & Kay [20]	Natural Resources Commission [23]
Implementing	Activity Tool	Implementation Rehabilitation and conservation measures	x			x	
Monitoring and evaluating	Standard Factor Activity	Monitoring and evaluation Monitoring Monitoring and evaluation			x	x	x
Information management	Standard Standard Factor Tool	Information management Collection and use of knowledge Multidisciplinary data Information management	x		x		x x

Quite often lists are presented as lists of independent items—as parts, factors, or elements, for instance. Sometimes they are presented as lists of inherently interdependent features—for instance, as facets or aspects. If we are not sensitive to the ontological assumptions of our framing terms, we may find ourselves forced implicitly and unreflectively to assert either radical atomism, because we are listing parts, or a radical holism, because we are listing facets. Another likely outcome, if we are insensitive to the ontologies implied by our framing terms, is that we will produce lists that are uncomfortably undisciplined. For example, both “monitoring” and “adaptive management” are identified as “factors” by Keough and Blahna [22], i.e., as separate features of ecosystem management. But monitoring is an essential part of passive adaptive management [24].

If we make these ontological choices more self-conscious and disciplined, we may find that neither listing parts or facets suits the case. For example, is systems analysis a part of adaptive management (say, as a step in adaptive management planning), or a facet of adaptive management (because a sensitivity to system structure and dynamics is fundamental to managing adaptively)? Or perhaps it is better considered as neither, understanding “adaptive management” as a term naming a family resemblance (to use Wittgenstein’s [25] term) in a tradition of practice?

If characterizing ecosystem management by lists of principles, activities, tools, etc. is unstable, because what should be listed, how the listed matters should be classified, and what ontological cues are most helpful, depends on the practitioner’s situation and intent, then in effect the advice that authors should be giving readers is: if you want to practice ecosystem management effectively, look for the ways each of these themes is relevant in the situations you are acting in.

Even with this reframe, to reintroduce more sensitivity to each practitioner’s situation, characterizing ecosystem management with this (Table 1), or a related, set of themes may seem uncomfortably thin. Consider the implications of the following reflections of Westley’s (as she explicates Evan Karel’s practice):

1. “the adaptive manager must have aptitudes for being a scientist, collaborator, politician, and agency manager simultaneously” [26] (p. 353)—“never taking action with just one objective in mind” (Karel quoted in [26] p. 337);
2. “to manage adaptively requires strong values as opposed to rational analysis” [26] (p. 352);
3. “to manage adaptively requires strong control of emotions, little fear of conflict, and great humility” [26] (p. 353);
4. “the experience of managing in complex adaptive systems is more similar to catching waves or looking for emergent corridors of action than pulling strings or working levers” [26] (p. 354); and
5. “under circumstances of such complexity, no practice or approach is in itself adaptive; no philosophy will work as an *idée fixe*” [26] (p. 352).

Westley’s reflections are likely to resonate with experienced managers. The more senior one’s role, the more diverse the set of contexts one needs to heed and act appropriately in, concurrently. Strong values—clear, fundamental orientations for action—make sense as a foundation for orienting oneself in unexpected situations. Skillful improvisation and openness make sense in uncontrolled environments. Humility is clearly enabling, when collaboration is essential. Resonantly, Carl Walters concludes ‘Adaptive Management of Renewable Resources’ with:

“Cutting through the list of adaptive tactics are the suppositions of enthusiasm to communicate, and willingness to accept fresh viewpoints. Possibly no human being can proceed with much balance in these dimensions. To be enthusiastic, one must develop a certain affection for a set of models and policy options. Then this affection makes it difficult to be open about criticism and new ideas. This brings me to a final tactical suggestion, the implications and implementation of which I will leave you to ponder: seek laughter at every opportunity.” [24] (p. 353)

These points that Westley and Walters make are both very important to describing skillful practice, yet it is almost impossible to make these points when the tacit model one has for characterizing

environmental management is more or less listing ingredients and providing recipes. Most of the feel of practice drops out of the picture in Bengston and others' [21], and Pirot and others' [19], descriptions, even though their documentation of practice repertoires and recipes is helpful.

"In the varied topography of professional practice, there is a high, hard ground overlooking a swamp. On the high ground, manageable problems lend themselves to solution through the use of research-based theory and technique. In the swampy lowlands, problems are messy and incapable of technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or to society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern."

Schön [7] (p. 28) comments

We can see Schön's point instanced in the contrast between these two kinds of evocation of environmental management practice. Knowing how to 'surf' environmental management situations, in which one is concurrently having to function as scientist, collaborator, politician, and organisational manager is much more important for an environmental management practitioner than knowing recipes for economic valuation, environmental auditing, or capacity building. The recipes are relatively easy to access, and the skills in 'surfing' complex situations are much more difficult to acquire and have much wider application.

So, *can* we represent practice know-how in ways that embody and evoke skills in surfing practice situations? skills in acting simultaneously as (for example) scientist, collaborator, politician, and agency manager?

Westley's [26] paper—"The devil in the dynamics: Adaptive Management on the front lines"—is a transitional text, in this context. On the one hand we can see the helpful sensitivity with which she evokes Evan Karel's practice. The points she makes (cited above) are of considerable interest, for characterizing environmental management. She is quite explicit that her intent is to support reflective transfer [26] (p. 335). But on the other hand she introduces her explication of Karel's practice with the apology,

"The descriptions that follow are based on extensive, in-depth interviews with a single manager. As such, the accounts are clearly biased. No effort was made to introduce other perspectives, and therefore the accounts in each case must be viewed as subjective." [26] (p. 334–335)

Resonantly, when it comes to articulating "questions for research", an expectation that some kind of 'technical control' would be the product of effective practice research runs through her questions:

- "Are strong values, emotional control, and interpersonal skills critical to adaptive managers? If so, are such characteristics essential across time and place?"
- "Is the juggling of four strategies [. . .] as important in all cases as in those described here?"
- "What is the critical structuring force behind adaptive cycles in social systems? [. . .] Is enduring, self-referent identity, in the form of consistent value orientation, the critical factor? How is that ensured in [. . .]?"
- "is his or her agency the critical link?" [26] (p. 359–360, emphases added)

Is a report based on a single case inherently biased or subjective (as opposed to objective)? Pullin and Knight [27] assume it is. They view with concern "increased dissemination of anecdotal (experience-based) evidence through magazines in which [conservation] managers share their experiences with management practices that usually involve a sample size of one with no control" in the United Kingdom [27] (p. 51). However a single case in a practice context is not analogous to a single data point in a quantitative study. As Brunner [6] (p. 152) comments:

"The practitioner needs to construct a detailed map of the particular context comprehensive enough to guide action in the context—a theory for n = 1. Conversely, the reductionist must abstract relatively few observations from many contexts to test a general hypothesis or theory."

In practice traditions, practitioners “tend to organize themselves into open networks and to engage in processes of innovation, diffusion, and adaptation” [28] (p. 55). Because each manager is learning from other managers’ experiences, managers’ reports of single cases are not assertions based on “a sample size of one with no control”. Each case expresses a tradition of practice. Many practitioners’ experiences cross in the language used, in what is looked for, in the kinds of actions considered, in the questions asked. Sharing stories is part of the process of diffusion, and an invitation to adaptation.

Should practice research be directed at the critical, the essential, at ensuring, at all cases, . . . (Westley [26] p. 359–360)? In a family of practice situations there may be no skills, practices, factors or links that are always “critical” or “essential” or relevant (see Wittgenstein [25] r.66–67 on how family resemblances do not involve essences). When she articulates questions for research, Westley assumes, in effect, that proper learnings from reflective practice will take the form of “covering laws” that warrant generalization of a natural science kind: statements that are “a general, perhaps statistical, proposition applicable to all instances in which certain combinations of variables are present” [7] (p. 31). As Schön [7,12] demonstrates, valid generalization in professional practice is largely on a different model. Resonantly, Shrader-Frechette and McCoy [29] (p. 121) write:

“If ecology turns out to be a science of case studies and practical applications, it is not obvious that this is a defect. Ecology may not be flawed because it must sacrifice universality for utility and practicality, or because it must sacrifice generality for the precision gained through case studies.”

To do justice to the relevance, interest and usefulness of her case study, Westley needs a different frame, one not distorted by seeing professional practice as “the application of science or systematic knowledge to the instrumental problems of practice.” [7] (p. 29)

The strengths in Westley’s account come from staying close to Evan Karel’s personal experience—how he personally understood and acted in situations, how he learnt from this, his commitments, his provisional insights and his difficulties. The weaknesses in her account stem from taking natural science style generalization as normative for practice understanding, rather than working with an alternative model that better fits the kind of understanding that reflective practice engenders.

From this review of descriptions of ecosystem management practice, what can we conclude about how ecosystem management practice, and similar practice traditions, should be modeled or represented? That our descriptions are faithful to practice. That they be grounded in cases. That they stay close to practitioners’ personal experience. That complex practice skills, such as acting simultaneously as scientist, politician and manager, be modellable. That the ‘feel’ of practice—ways of practicing (with humility, with an eye for laughter, with openness, . . .)—be modellable. That the kind of logic we use when we model know-how be one that cues reflective transfer, not one that is silent when a case does not fit already articulated patterns.

1.2. Researching Sensibilities

An alternative model for explicating practice know-how—a different paradigm, embodying a different epistemology—emerges if we look closely at the first person experience of practitioners [17,30]. Following Schön [13] (p. 24,30), Taylor [31] (p. 41), Gendlin [16,32] Todres [33], and Shotter [15], we can focus on the “sense” practitioners make of their situations, on their “feel” for how to act, on the “qualitative differentiations” they rely on as they orient themselves, on where they are “coming from”, on what they “imply”, on their “sensibility”—rather than on what they can be observed doing as such. This is a seemingly subtle shift in focus. The shift is easier to discern in our own experience than to describe. Imagine pausing now to explain to someone in your professional milieu what you have made of this paper, thus far. What would you say? How would you know what to say? You don’t need to go back and laboriously reread the text in order to be able to explain. You speak ‘from’ some such. Indeed that is the point of reading: reading builds a ‘sense’ of what the text is saying, from which we can then act and speak [16]. What exactly it makes sense to say may be unclear—but we experience

the presence of our sense of what is at stake, our sense of what it means. This contrast is obvious in a similar way when we have forgotten something and have it on the tip of our tongue: we can check with what we know—recognizing whether something suggested fits: we both know (have a definitive feel for) and don't know (don't know what to say or do). It is also obvious when we are editing a text we have written—we can feel when something we have written does not fit and needs to be revised, and we have some sense of what is needed—and in many other instances, such as finding words in delicate negotiations, or the emergence of ideas in design processes. Having a *felt* sense of something, of the kind these examples point to, is evidently a different kind of phenomenon from experiencing an emotional charge or appreciating a logical pattern. It is, as Gendlin [16,32] puts it, a somatic experience of meaning—a phenomenon that is difficult to describe when we use concepts that tacitly anticipate a mind/body dualism. Gendlin's [16,32] terminological innovations (e.g., “felt sense”) stem from the challenge of finding an unambiguous way of pointing to these phenomena.

Although this shift may be surprising, it has a number of advantages when our aim is to model environmental management practice, and sustainable development practices generally. The essential benefit is that this shift directs us to know-how as such, as experienced by practitioners, rather than to representations of it in models, schemas, explanations, explicit repertoires and procedures, etc. After this shift a number of paradoxes that arise when we are trying to describe practices become intelligible.

1. Our felt know-how is inherently holistic: it is a sense of the whole of what we experience as relevant—the whole text, the whole situation (as we understand it). We can speak from it at length. Whereas our words can be laid out sequentially, our feel of what makes sense is an evolving whole. (Gendlin [16] and Walkerdien [17] develop this point further.) Acting simultaneously as scientist, collaborator, politician, and agency manager [26] (p. 353) is thus perfectly natural: if one knows how to act as scientist, collaborator, politician, and agency manager, then in situations where this know-how is required, the actions that make sense to us are ones that make sense to us holistically—because they ‘fit’ a feel of ‘the whole’ of what is at stake. Evan Karel's know-how is paradoxical when we assume that acting is doing one thing at a time—as the metaphors “procedure” and “repertoire” invite us to assume. It makes sense that an experienced practitioner could practice in this sophisticated way when we recognize that the know-how one acts from is a feel for what is needed.
2. The underlying orderliness in professional practice is easier to grasp. As Westley [26] (p. 334) comments

“the fragmented and chaotic world of most managers' work lives [is] far removed from the planning and coordinating that the literature said was an accurate description of the manager's job”.

But from a first person perspective, management, including ecosystem management, is far more orderly than it seems when we take plans and procedures as our norms for orderly action [30]. The stability in ‘where a manager is coming from’—their evolving felt sense of what is needed—provides a (relatively) high level of orderliness that sits below the level of analysis, when description and analysis are directed purely at what a practitioner is observed doing.

3. We can start to see how it is that diverse practices hang together as one overall practice—as ‘ecosystem management’. The facets that Pirot and others [19], Bengtson and others [21], etc. (Table 1) list make more sense. Simply listed, they may seem ad hoc. Once one recognizes that we act from an holistic feel for what is needed, a sensibility, that is based on our experience to date, it is easy to see that the practices we draw on will be simply those that we have found relevant. The orderliness of know-how is quite unlike that of deductive logic or explanations of cause and effect. It has a radically historical character: where we have got stuck, and what we have found works, stand out. We orient from what we have found to be salient and what others suggest to us may be salient. This kind of orderliness is radically pragmatic. If we set out to

explicate know-how as if it should have a formal orderliness of a usual kind—for example taking scientific description as normative as Schutz [34] does—then practice know-how seems like a strangely distorted take on reality. Mapping personal geographies to disciplined cartography is an illustration of this—our knowledge of the places we haunt appears idiosyncratic. But on the other hand, a skillful, experienced practitioner’s know-how is, demonstrably (because they are flexibly skillful), finely ordered, in relation to the practice situations they meet. The lists that Pirot and others [19], Bengston and others [21], etc. provide (see Table 1), feel somewhat *ad hoc* because the practical saliences are not explicated: how one might come to take these diverse actions as part of a practice of ‘ecosystem management’ is not foregrounded.

4. By placing holistic, felt understanding at the centre of our analysis, the openness and flexibility we experience as practitioners—in the first person—is foregrounded. Emphasizing the pivotal role of practitioners’ sensibilities supports reflective transfer. It supports readers’ reliance on their own sensibilities, rather than on an author’s authority, for instance, as they make judgments about how it is appropriate to act in their practice situations.
5. By explicating practitioners’ sensibilities, we leverage the ‘digestion’ of practice situations that practitioners have already done. For our findings, we draw directly on their feeling for what it makes sense to look out for, what possibilities it makes sense to have in mind, as one adapts to evolving situations. We leverage practitioners’ know-how, in a way Brunner envisages:

“the materials for a political science [are] to be found in ‘political prudence,’ the working knowledge of politics in various persons and groups. Similarly, the materials for a paradigm for [policy science] practice exist in the working knowledge of policy practitioners and their advisors.” [6] (p. 161)

1.3. Research Questions

This paper is an exploration of this shift in approach to characterizing environmental management: researching professional sensibility as such. It is a modest enquiry, intended as a proof of concept of the utility of this approach. It contributes a model of environmental management know-how developed by explicating my ‘feel’ for environmental management practice, which embodies learnings from over twenty five years action research in management and consulting roles, and more recently from academia, much of it on the eastern coast of Australia. The fundamental orientation of this research is empirical: it speaks from a concrete body of practice.

My feel for the practice—like any experienced practitioner’s—is far from an idiosyncratically personal take on how to influence the dynamics of the socio-ecological systems we are embedded in, however. It is inherently personal and inherently social, because we are inherently personal and inherently social. We each practice in practice traditions; to explicate my practice is to explicate a reading of, and understanding of, and a practicing of adaptive management approaches, with their particular emphasis on embracing uncertainty and expecting to be surprised [24,35], for instance. It is also a window on my colleagues’ practice: on what I have learned from them, on what we have learned together, etc. But in being situated, it is also a lens on a wide network of professionals and others engaged in seeking to influence the dynamics of places helpfully. We influence each other through framing problems, exploring options, and encountering difficulties.

If just one person’s experience is directly drawn on when building a sensibility model, as here, there is a socially-local character to what is documented. Obviously, the impacts of that localness on the model one builds can be reduced by interviewing many practitioners with experience in a particular setting, and looking for gradually increasing ‘saturation’ [36]: more and more repetition in what one learns about skillful practice. The richness of the practitioners’ experience, and their capacities to explicate that when, in interviews, they are helped to heed their felt sense of the issues and possibilities, will also obviously have a marked influence on the accuracy and astuteness of the model. My claim for myself is simply that I am a useful window on this complexity, at least for people

working in broadly similar settings. We are each instances of our collective practice, and there are profound ‘family resemblances’ amongst our approaches to practice. Being local and personal does not make a model of know-how inherently quirky, or inherently unreliable, or opaque when questions of generalizability arise. Experienced practitioners will always be an incomplete, but relatively rich, window on the possibilities of a practice tradition.

The sensibility model laid out below is intended as a decision support tool: supporting reflective transfer from my experience working to sustain Australian socio-ecological systems to readers’ management of systems of interest to them. It is a representation of my sensibility. The model is capable of further elaboration—in fact a vast amount of elaboration, because (i) it is an explication of a body of practice, and (ii) many more practitioners’ insights could be drawn into it. Closure is not possible in principle, but models can be developed that are helpful in different respects, helpful in different families of cases, and/or helpful in a wider range of cases. To be helpful is the intention here.

The enquiry is at two levels:

1. Place management: What does an explication of my experience—based on a long period of action research, much of it undertaken in professional roles, and embodied in a ‘feel’ for what might come up, a sensibility—add to the understanding of ecosystem management practice summarized in Table 1?
2. Knowledge management: Does explicating a practitioner’s sensibility convey the ‘feel’ of practice better than is possible with more conventional case study research, in the process bringing distinctive aspects of ecosystem management practice into focus?

The place management layer speaks directly to the question: what innovations (fresh approaches, new practices, helpful reframes, etc.) are evident in my practice (that is, in my and my colleagues’ practice, as registered through my knowing-how)? Then viewed as a worked example of a method, it brings the possibilities for researching practices by explicating practitioners’ sensibilities into focus, pointing up possibilities for knowledge management in the sustainability professions, and generally.

2. Methods

Three specific methods play fundamental roles in this research [30]:

1. experimental practice: using practice as a medium for inquiry into, and innovation in, forms of practice;
2. a distinctive kind of reflection: one that involves a disciplined return to one’s evolving ‘feel’ for what is at stake; and
3. a distinctive grammar and logic: one designed for laying out a single ‘feel’ as a differentiated sensibility, a sensitivity to what may be helpful.

Each of these is outlined in the following sections.

2.1. Experimental Practice

The practice experience which this paper primarily draws on is the author’s action research as a reflective environmental management practitioner, committed to pursuing sustainability. I worked for a local government authority (Wyang Shire Council), on the east coast of temperate Australia, 90 kilometres north of Sydney. Subsequently I have contributed to environmental management efforts in a variety of Australian regions, in consulting and action research roles. At Wyong, via matrix management arrangements, I was responsible for managing the water cycle in a catchment to protect a series of shallow estuarine lagoons—the Tuggerah Lakes, and for conservation of terrestrial biodiversity in a coastal strip bounded in the east by the Pacific Ocean, and in the west by a mountain range, the Great Dividing Range, and also for overall management of all environmental issues in the local government area. The Council’s water cycle management responsibilities included provision of potable water and sewage treatment, management of drainage, most pollution control, and

community education. The lakes are the historical centre of settlement, and the Council's administrative boundary closely matches the lakes' catchment boundary. The Council's key biodiversity conservation responsibilities were land use planning, management of Council owned land, and local management of invasive species. Conservation goals at local, regional and national scales shaped the Council's conservation activities. The focus of the explication is this work at Wyong; other work in similar socio-ecological systems informs my feel for what may be worth heeding.

My practice has been experimental in three ways differentiated by Schön in his account of reflective practice [13] (p. 70–71):

- exploratory—"the probing, playful activity by which we get a feel for things",
- move testing—"any deliberate action undertaken with an end in mind is, in this sense, an experiment", and
- hypothesis testing—experimenting to discriminate "amongst competing hypotheses [... acknowledging that] the hypothesis subjected to experiment may be one that has been implicit in the pattern of one's moves".

The overall pattern of my practice personally, my team's, and, with respect to environmental management, our organization's, was exploratory. We knew that we did not know how, confidently, to sustain the lakes or conserve terrestrial biodiversity. Our approach was self-consciously exploratory.

Move testing played a significant role. For example, we explored how to do capacity building in environmental management in our organization, via a series of projects which we managed so that they achieved capacity building objectives, as well as the projects' substantive objectives. These projects were: design and construction of a set of constructed wetlands, development of a water sensitive urban design approach to a district centre, development of a water sensitive urban design approach for a residential subdivision, and development of a management strategy for a large natural wetland with considerable urban development in its catchment. We experimented with workshop-based decision-making, expert input, internal and external facilitators, and working on actual (funded) projects and possible (unfunded) projects.

Hypothesis testing also made a significant contribution. For example, we expected that an adaptive management experiment with constructed wetlands on the lakes' edge would make a significant contribution to our understanding of the potential of these wetlands to affect lake dynamics.

Is it reasonable to build a model of environmental management practice relying wholly on explicating one's own experience? There are two issues here:

1. this involves building a model of a practice from only one person's experience; claims made from it must be limited accordingly; and
2. one is saying to one's colleagues: I can explicate my experience in a way that is valid and reliable, for my research purposes here.

Taking the second issue first, researchers are always speaking from personal experience (their own and colleagues) when they report their research. Researchers personally assert the validity and reliability of their findings [37]. What is less common is for this relationship to be reflexive: for the researcher to be researching themselves. Nonetheless, there are many research traditions whose findings come from researchers explicating their positioned involvement *in* their circumstances, which we normally (in Polanyi's terms) 'subsidiarily attend from' rather than 'focally attend to' [38] (p. 224). These include:

- first person action research [39–41];
- first person reflective practice research [42–44];
- phenomenological enquiry [45–47]; and
- autoethnography [48–50].

The standing of these traditions is debated. What is at issue is the accuracy of these reports, and in particular their susceptibility to unrecognized bias. An important check and balance has been weakened: the separation of the observer and observed. What is needed here is ways of investigating our own experience of ourselves that are dependable, and expectations of our reflexive research that don't ask more of our methods than they can deliver. In this research the fundamental warrants of validity and reliability relate to qualities of a process of explication [51] (p. 132–3). If one can *feel* what one knows, and speak reliably from what one feels, then what one says is an explication of one's felt sense. I consider issues regarding the validity and reliability of my explication of my sensibility in detail in the next section.

The proximate question that explications of sensibilities address is a simple, and perhaps unambitious, one. They describe simply what people are relying on as they practice. They are not an analogue for a kind of mechanical control—along the lines of 'if you do this, then it will work out that way ... '. Instead their standing is empirical; they assert simply 'a practitioner in these circumstances has been relying on this (evolving) sensibility as they practiced'. As findings, their interest is then a function of their relevance to one's research questions.

A more fundamental consideration is that if one's research goals include explicating practices to help practitioners (either directly, or by laying foundations on which decision support tools can be built), as they do here, then the researchers need substantial personal experience of practicing. As a researcher one can work with reflective practitioners, but without personal experience of practicing, the risks of mistaking aspects of how practice is, in the first person, are high. Bourdieu [52] has underlined this, demonstrating systematic bias in anthropological and sociological accounts. Mintzberg's experience is that one cannot teach people to manage if they lack significant management experience. A fortiori, building tools (or the foundations for tools) that support practitioners feeling their way into situations, as we are here, without this experience, would be very difficult. Mintzberg [53] (p. 28,30) comments regarding teaching management:

"Managers are not created in a classroom, but practicing managers in a classroom can step back from work pressures and learn profoundly from their own experience. [...] Management is a practice that has to combine a good deal of craft, namely experience, with a certain amount of art, as vision and insight, and some science, particularly in the form of analysis and technique. But students without managerial experience lack the craft and have little basis for the art, and so programs to train them have relied on the science, and that's what leaves a distorted impression of management."

From this perspective, spending a number of years working as a reflective environmental management practitioner, undertaking action research, is an efficient way to further this research program.

This brings us back to the first issue, however: if we build a model of environmental management practice from one person's experience, what powers does it have? What can it appropriately be used for? What is its standing?

A model based on one person's experience may convey a great deal about a practice. Its contribution depends on the breadth of their experience, the subtlety of their understanding, the depth of explication in the research process, and so on. Some expert systems are built with input from one or two experts [54] (p. 50). In interviewing experts to discover decision rules to build into expert systems, the procedure is to begin with one expert and to keep interviewing other experts until the rate at which new insights or perspectives are emerging has dropped away sharply [55] (Table 3), [54]. Depending on the case, this can happen quite quickly or quite slowly. Here I have not done that. Explicating my own experience, I have provided a starting point. Given that my practice has been relatively influential in terms of organisational change, regulatory change, sourcing of funds, and winning of awards, I am confident it is a solid point of reference. It is important to keep in mind, however, that the difficulties that we are having sustaining places, in practice, in most parts of the planet, demonstrate that there is room for huge improvement on current understandings.

What a model based on one person's experience can clearly be used for is "reflective transfer": exploring ways in which what has been learned in one situation is relevant to other situations (Schön 1995). Its standing is primarily a matter for readers to judge, not authors, as its standing depends fundamentally on what readers find it useful for. An informal version of this process is widely used—consulting colleagues and experts whose insight and depth of relevant experience make it likely that they will have things to say that you will find helpful. In imagining a 'science of practice, where generalization is via reflective transfer', Schön [7] was imagining a more disciplined, more public version of this process. When you consult a colleague for advice, your colleague often helps you see the relevance of their experience to your situation. To craft a research tradition from reflective practice, writers need to explicate and document in more general ways, and readers need to do more of the work of discerning relevances for their own situations.

The methods used in this research project to discipline my explication of my experience so that it can contribute to a scholarship of practice [7] are discussed in the next two sections.

2.2. *Explicating Know How—A Distinctive Kind of Reflection*

All experience of meaning involves feelings of meaning: if you did not have a 'sense' of what you are reading, that you can speak from to explain what you have read, you would not count as having understood what you have read [16]. Sometimes we directly heed and speak from our felt experience of the meaning of a situation, and at other times we don't. Whether we do or not, and how we do this, makes a considerable difference to the subtlety and accuracy of our thinking [16,17,56,57].

What makes it possible to use this differentiation formally in reflective practice experiments is that people can be induced into reflecting this way [56], they can be trained to think this way [58], and one can measure the extent to which a person is speaking from a directly felt sense of the meaning of their situation [57,59].

In this form of reflective practice experiment, practitioners are checking more or less continuously whether what they are saying fits, holistically and intricately, their felt sense of their practice knowledge and experience [16,56,57]. These first person skills in heeding felt understanding need either to be invoked by, or evoked in, practitioners if properly grounded models of sensibilities are to be articulated. In my case, I learnt Gendlin's [58] approach over thirty years ago, and found that learning to use these skills in a disciplined way was very helpful. It enabled me to employ these skills more reliably, and in a wider range of contexts, than I had done previously. For this research, I have used this kind of reflection—heeding and explicating my felt sense of what my environmental management experience implies for further practice—in a disciplined way, returning again and again to my sensibility to explicate it, and to check my explications.

We might ask, though: is this a rigorous method? Is it reliable, valid and replicable? The most fundamental point is that this research is replicable. By finding broadly similar environmental management situations, and learning these first person skills oneself, working in the situation, and then explicating what one learns as registered in shifts in sensibility, one can lay out findings to compare with those I report here. Or alternatively, by finding practitioners who already have this kind of experience, and learning how to interview in ways that direct them back, again and again, to their felt sense of how to practice in such situations, one can also lay out findings to compare with those I report here [30].

Validity in these explications of sensibilities is primarily a function of two aspects of the process: (i) Is the practitioner checking with their felt sense—or perhaps confusing their professional 'feel' for what's needed with an anxiety about what they should say, or stories from their tradition about how practice 'ought' to be (e.g., what they were taught at university about such practice), or what with hindsight seems like a logical way to have proceeded? (ii) If the practitioner is checking with their felt sense, are they doing so consistently—so that their 'explication' is wholly grounded in their felt understanding? Both these are a matter of first person skills, that people can be taught to use themselves, or (usually) induced to use. Of course, no methodology is foolproof, but researchers

leveraging Gendlin's fundamental research have demonstrated that we have disciplined practices that we can use in this way [57,59].

Reliability is more complicated in that we are dealing with explication, not repetition, when we ask a person to recheck something they have just said with the felt sense they were speaking from. If we have a felt sense of something, words to describe it come, we check back with the felt sense to see if the words sit comfortably now, and we find they don't and a different way of making our point comes—a process that, informally, many readers would be familiar with (e.g., from drafting and revising)—the relation between the earlier formulation (that now doesn't fit) and the new formulation (that now does) is genealogical: the earlier one gave rise to the later one. What one can explain, looking back, (if you have indeed been speaking from a felt sense throughout, as opposed to making a mistake at first, e.g., speaking distractedly first time around) is how the first one seemed to fit, and then how it has come about—with such and such new insight having occurred to you—that in fact the second formulation is the better one to use. In place of reliability demonstrated through repetition, we have a hermeneutic reliability: what warrants the reliability of our formulations is our ability to articulate why the shifts in interpretation make sense.

A kind of reflex distrust in these first person skills is not warranted. It is reasonable to assert in good faith that one knows and uses such methods, as we do, implicitly or explicitly, whenever we describe methods we have used in any kind of research. But having said that, readers experienced in ecosystem management can get a direct reading on the model's relevance for them by reading it, as requested, as a model of a sensibility—i.e., letting the model evoke a sense, for them, of what it may be helpful to look out for, and to consider doing—and then comparing the sense of what may be relevant that the model evokes with their own personal sense of what they find relevant themselves, in the situations of interest to them. This is not a proof of the model's accuracy as an explication of my sensibility of course. But it is a useful test of its powers as a sensitizing tool, and that is a useful proxy for a direct test of its accuracy as an explication, given that the point of explicating my sensibility in this way is to support “reflective transfer” from what I have learned about environmental management, which is an expression of the practice traditions in which I have worked, what my colleagues' and I learned working together, and my experimentation and reflection specifically.

2.3. *Modelling Know How—A Distinctive Grammar and Logic*

A distinctive logic—and a grammar to remind us of it—are needed if we are to model our sensibilities—our sense of what may be relevant and what it may be helpful to do. We need a logic (in the sense of fundamental organising principles—cf. ‘the logic of scientific discovery’ or ‘the logic of practice’) that enables us to accurately, resonantly describe felt understanding.

Our feel for the situations we are in is inherently holistic in a way that what we say is not: we speak from a sense of what is going on, of what is at stake [16,17]. Equally, our feel is open: we can return to it and speak from it again and again to make our point in different ways [16,17,30]. How we should model this ‘felt’ sense of what is at stake is obviously a key question for a research program of this kind.

The logic that is implicit in our descriptions is fundamental. If, tacitly, we use a logic that construes ‘where we are coming from’ as a set of *separate* insights, then we will have mistaken its essentially holistic character. Equally, if, tacitly, we use a logic that construes our feelings for what is at stake as fixed and closed, we will have mistaken its openness: its capacity to be expressed precisely in many ways.

These might seem like arbitrary possibilities; in fact they commonly disrupt efforts to describe practices. The difficulty is that we usually think about practices using terms like ‘repertoire’ and ‘procedure’, and usually use these terms tacitly assuming that a logic of motion in a positional space applies. When we are led by such a logic,

- we describe practices as if one had to be doing one thing at a time,

- we presume that action that makes sense is sequential, following a practical logic, except when we are responding to interrupts, and
- we underplay the possibilities of creative practice, because we assume, de facto, that our ‘decision space’ is closed: that there is, ultimately, a single correct way of conceiving it.

Again, these are not usually self-conscious, explicit commitments. The difficulty is that we commonly let the possibilities of mathematically describable spaces guide us as we describe the possibilities of practicing [32,60].

A direct way to address this challenge is to consider what kind of logic we need to use to accurately, resonantly describe felt understanding [16,32], and then embrace that explicitly as the logic of our descriptions. Figure 1, which summarises the results of this research, is an illustration. To be understood, it needs to be read as expressing an unusual orderliness. “Perhaps finding . . . ” and “perhaps implying . . . ” are the basic forms of generalization offered in a sensibility model. Here a ‘generalization’,

1. Marks a possible relevance. A sensibility model eschews making assertions about what is ‘essential’; it is an invitation to reflective transfer. It suggests what we *may* find, what we *may* imply. In marking a possible relevance it keeps each practitioner’s first person experience in the centre of the process, continually inviting practitioners’ checking whether what is marked is relevant to them. If what is modelled isn’t, or isn’t exactly, relevant, these generalizations stand as a direct invitation to each practitioner to notice what exactly is relevant for them here.
2. Is about what we may find (what we may recognise as our situation), and what we may *imply* (our sense of what directions it may make sense to head). The word “imply” is a reminder of Gendlin’s [16,32] philosophy of the implicit. The key point here is the point about the openness of our felt understanding: we grasp where we are coming from more fully in felt understanding than in words or equations. Our felt sense of something is a sense of the whole of something and is a way of ‘knowing where we are coming from’ that directly supports creative action in situations. When we are describing our feel for what makes sense with a diagram or text, it is essential for writer and reader not to lose sight of the fact that our feel is not wholly grasped in what we say we imply. Such models point towards sensibilities, and can do no more than that. If we lose sight of the pointing, we lose sight of the creative openness which is inherent in working directly from the feel of our situations as we find what it is appropriate to do.

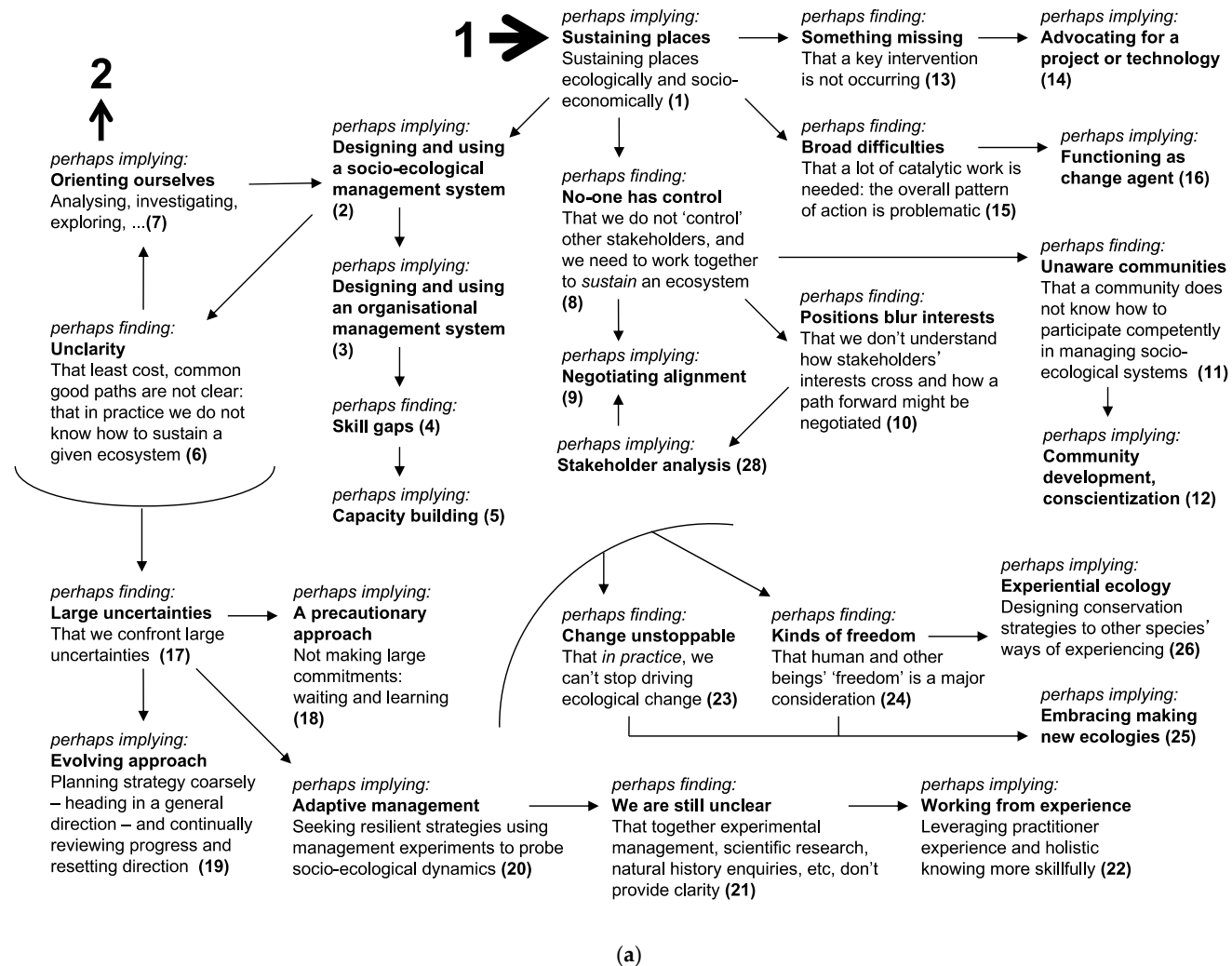


Figure 1. Cont.

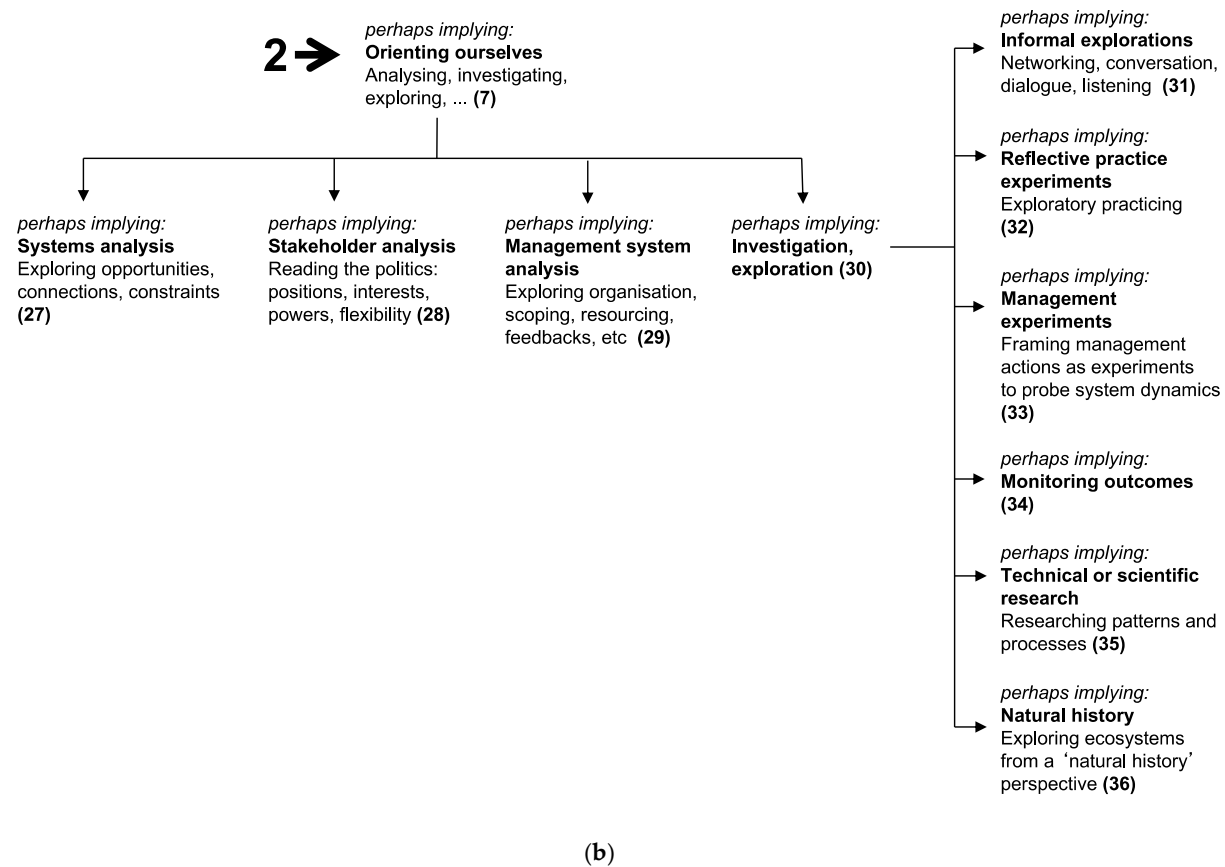


Figure 1. A model of ecosystem management: (a) overall gestalt.; (b) orienting practices.

The logic of sensibilities which guides the writing and reading of diagrams like Figure 1 provides for [30]:

- being in multiple places at once:
 - being in all nodes at once: coming from a sense of the whole of a practice as such,
 - coming from a few nodes at once (one's sense of the whole is in the background);

In each case we come from a crossing of the places (e.g., in a negotiation one might say something which is at one and the same time politically astute, ecologically astute, and practical: a great deal may cross in forming what one says);

- moving non-linearly:
 - one's thinking may, apparently, jump around the nodes differentiated in a diagram like Figure 1, following the relevances of a situation;
 - one's thinking may depart a little or a long way from what is modelled explicitly in Figure 1, moved by a sense of how what is modelled does not fit one's situation;
- carrying where we were forward, as we continue to explicate, as opposed to leaving it behind, as the logic of motion in positional space requires that one do.

How we move within a sensibility, as we savor the possibilities it suggests, is very different from how we move in a coordinate space. If we rely unselfconsciously on terms like 'repertoire' and 'procedure', there is a lot that occurs in creative, skillful practice that we cannot describe clearly. We need a formal reminder to use an alternative logic when describing practices (and a fortiori forms of life). The grammar of Figure 1 is intended as such a reminder; it needs to be read with this logic in mind to be understood as intended. We are accustomed to talking as if we do one thing at a time, and have a set of separate practices that we draw on, in sequence, as we pursue our objectives. Yet skillful practice is not on this model: a single action (e.g., a contribution to a conversation, writing a sentence in a report) may be an 'action' in multiple practices at once—a piece of analysis, a move in a negotiation, holding someone to account in the way a management system calls for, etc. The notion that we do one thing at a time and draw on a set of separate practices is a useful heuristic for unpacking the complexity of professional practice; but it becomes misleading if it is taken as a representation of how *skillful* practitioners act (it is less distorting as a model for novices' practice, as they often work more procedurally). If one is acting from a "felt sense" [16,17] of what fits a situation, knowledge of diverse practices shapes what one does. Sensibility models like Figure 1 are designed to acknowledge that, and to invite practice that embraces that complexity—because holistic action of this kind is often more likely to be effective in practice.

3. Results

Figure 1, parts (a) and (b), is an explication of my sensibility as an ecosystem management practitioner. It sketches my overall gestalt—the family of practices I experience as particularly salient as I orient myself in ecosystem management situations (Figure 1a), with particular detail on the family of practices I use for deepening my understanding of what is at stake and what is possible (Figure 1b).

Looked at personally, it is grounded in my experience with water cycle management, terrestrial biodiversity conservation and urban development at Wyong, north of Sydney, and it also reflects experience with a number of other regions in Australia, including the Great Lakes (on the east coast of Australia), the Murray-Darling Basin, and the catchment of the Great Barrier Reef. But as I emphasized earlier, this is a personal expression of social learning. Each of us is an instance of our shared social reality, so the sensitivities documented are not simply my personal sensitivities. They are concrete, local expressions of our collective efforts to become more skilled at influencing socio-ecological dynamics in helpful ways.

In the following sections I take this explication further, fleshing out some strands of Figure 1's account of the lines along which professional practice may develop in particular settings, speaking from my *felt* sense of ecosystem management practice.

Because we are explicating, closure is always provisional and pragmatic. More could be said on all aspects of my sensibility, in places a great deal more. What has helped me in the situations in which I have worked may be helpful in other situations. It is inherent in research of this kind that what we find is not normative. It is exemplary. It reflects particular experiences in particular places in particular communities. These findings are an invitation to what Schön calls reflective transfer: an invitation to readers to explore seeing situations of interest to them as resonant of those I have encountered. They are designed to invite reflexivity: inviting checking your own sensibility regarding what it is helpful to heed in ecosystem management against my explication of my sensibility.

They are designed to support readers deepening their sensitivity to the possibilities and pitfalls in particular environmental management situations of interest to them, and in situations of this kind generally. The results are thus at one and the same time findings from a passage of practice and a non-normative decision support tool. (A partial, provisional tool; however, our tools are always partial and provisional; their subtleties, scopes and powers differ.) To be understood as a model of a sensibility, Figure 1 and the explicating notes that follow need to read from the reader's own evolving sense of what might be important or interesting in situations of this kind. Because they are supports for reflective transfer from one or more person's experiences to others', the kind of reflective reading and considering that readers do as they read is integral to a sensibility model conveying a sensibility. The explication is intended to point to a felt appreciation of possibilities. To be understood as a model of a sensibility—rather than say as a schematic narrative—readers need to let a feeling for the shapes of these kinds of situations be evoked in them as they read. Reflective transfer, in the sense intended, hinges on this.

3.1. Kindness (Node 1)

Implying sustaining socio-ecological systems (sustaining places: node 1, Figure 1) is professionally legitimized by national and international commitments to sustainable development, so it readily sits as a root implying in a model of ecosystem management practice.

However personally I don't experience it as foundational. I am moved by a sense that kindness is an appropriate way to live—by a sense that caring for myself, for other people, and for other kinds of beings, is a good way to live—that this in some way 'fits' the nature of reality, or the nature of our lives. To understand my ecosystem management sensibility accurately, one must understand that it is a kind of half-formed, part-developed movement in the direction of kindness, compassion. My practice both comes from and is a sketchy embodiment of an inclination to be kind. So, the sensibility documented here is what I have learned about how to be kind when influencing the dynamics of socio-ecological systems.

3.2. An Entrepreneurial Approach (Nodes 13 to 16)

Working within a government agency we have choices about the extent to which we take personal responsibility for catalyzing change in organisational practice to serve the public interest. Most socio-ecological systems are not being managed sustainably. So, there are usually many kinds of contribution we can make as advocates or change agents that are aligned, at least in principle, with agency goals.

My leaning towards kindness leads me to be more sensitive than I might otherwise have been to the very wide range of 'experiences' that human and non-human stakeholders have of situations. In turn this leads me to look for ways to weave together these interests—to find common interests. My practice as advocate and change agent is grounded here: in a kind of restless development of more, rather than less, inclusive ways forward.

At Wyong I found working intrapreneurially—working entrepreneurially within a key environmental management organisation—was an effective way of working to sustain the Tuggerah Lakes. We (my team and I) advocated for key technologies—notably water sensitive urban design—and developed a strategy for catalyzing change that Figure 1 reflects. Key elements of our change management approach included:

- analytical work (nodes 27 to 29) to set agendas for policy deliberations, e.g., multi-party, multi-disciplinary exploration of catchment-lake dynamics, with simulation modelling used as a tool to help stakeholders stay grounded in socio-ecological realities;
- developing alignment amongst stakeholders and in professional networks (nodes 8 to 12) by negotiation and community development (e.g., supporting local NGOs);
- legitimizing policy shifts by advocating and negotiating changes in headline policy documents (e.g., the Council Management Plan and the catchment's Stormwater Management Plan, both of which articulated commitments to water sensitive urban design standards for new urban developments, and to a range of other catchment management improvements);
- capacity building projects (nodes 4 to 5) designed to develop individual and corporate skills; the projects with the greatest influence were where we took innovative projects (e.g., design, construction and maintenance of a set of artificial wetlands, development of water cycle management standards for a district centre, and development of a catchment management strategy to protect a major wetland) and used them as vehicles for capacity building by involving a wide group of staff in workshop based decision-making, and bringing in experts to contribute to workshop discussions; these projects worked at three levels at once: building organisational capacity by (i) developing individuals' skills, (ii) developing informal networks amongst staff interested in the innovations, and (iii) legitimizing a changed approach;
- providing informal support for changes in practices by making environmental management staff available for advice and as contributors to projects across the organization; and
- developing formal performance audits and ecological assessments to evaluate progress.

One can see here how 'functioning as a change agent' (node 16) is implicit in diverse nodes in Figure 1. This illustrates the unusual logic that a reader needs to assume reading a diagram like Figure 1 to read it as a model of a sensibility. My feel for environmental management practice—my professional sensibility—is flavored by a kind of entrepreneurial openness to and interest in opportunities for catalyzing helpful change.

Our work led to a wide range of changes in policy and to substantial shifts in funding (notably in the urban development program). Wyong Council won a number of awards for its work in catchment management, stormwater management, and water sensitive urban design. Ecological assessments indicated further decline was not occurring, though a longer time series is needed to reach definitive conclusions regarding the lakes as a whole; modelling implies this work made a substantial contribution to ecological outcomes.

3.3. Working Collegially and Collaboratively (Nodes 8 to 10)

In ecosystem management the usual case is that stakeholders are interdependent and that no one stakeholder group can force systems down sustainable pathways. As a result collaboration is widely recommended (e.g., Table 1).

Although it might therefore seem a matter of stating the obvious, I often find it helpful to remind myself and my colleagues of this interdependence, and of the diversity in our interests, because it is easy to take our own horizons, sensitivities and values as normative. Much professional advice in scientific papers and management studies is written as if there were a single point of view on policy questions that unselfish people of good will would adopt, for example. Sometimes this is done unreflectively; sometimes it is a rhetorical tactic used to marshal support for a particular approach.

3.4. *Triangulating Politically, Managerially and Socio-Ecologically (Nodes 27 to 29)*

A sensitivity to the political, the managerial and the socio-ecological make an organizing contribution to my feel for effective practice, in a way that is very akin to Evan Karel's feel for his practice [26]. Analyses in these three areas test different kinds of legitimacy. Socio-ecological systems analysis (node 27) tests both technical and ethical standing, asking what courses of action make sense, given the general goals we set ourselves? Many kinds of technical analysis sit under socio-ecological systems analysis as I practice it, e.g., engineering, planning, legal, ecological and economic assessments. Management system analysis (node 29) is focused more on efficiency, asking whether operational plans are aligned with policies, whether resources are allocated efficiently, whether plan-do-review loops are closed, etc. Stakeholder analysis (node 28) is oriented towards finding common interests, finding ways to frame matters that bring people together, etc. It lets go the search for a unitary point of view regarding outcomes and process (as exemplified in socio-ecological and management system analysis), and supports negotiations.

Using all three we know what we want to do strategically, we know what that means in terms of organizational life, and we have a sense of whom to negotiate with and how to negotiate with them to get the shifts we are seeking.

From a practical perspective, it is a sensitivity to what makes sense in these three domains that I find most helpful, not the formal methods themselves. Using the formal methods, we develop these sensitivities. Having worked with all three for many years, I fall back on the formal methods from time to time when an issue is particularly complex, or a formal procedure will make a distinctive contribution (e.g., collaborative socio-ecological systems analysis can discipline negotiations, foregrounding socio-economic and biophysical constraints, uncertainties and implications [17].

My approaches to management system analysis and stakeholder analysis have been indicated in the two previous sections. My approach to socio-ecological systems analysis is shaped by the Adaptive Management tradition. Adaptive Management [24,35] affirms the usual sensitivities to processes, flows, stores, sources and sinks, but it adds some distinctive valuable emphases, including:

1. taking a management-oriented approach to systems analysis, where management decisions are included in simulation models, and the scope of analysis is aligned with decision-makers' needs; and
2. a sensitivity to uncertainties, and thence (a) a deemphasis on details that don't improve the precision of decision-making, (b) a sensitivity to research that can exercise substantial leverage over policy choices, and (c) an eye for more resilient stances: stances with liveable outcomes across a range of possible worlds.

3.5. *Researching (Nodes 30 to 36)*

Uncertainty (node 6) is a common experience in environmental management practice, because we are often on a learning curve personally, and sometimes we are moving beyond the bounds of collective experience.

My experience has been that informal explorations—mostly conversations—have made the largest contributions to my learning (node 31). My feeling is that we commonly underestimate these skills in professional training, taking them for granted. Skillful conversation involves a kind of mutuality: listening with care to oneself as well as with care to one's companions. It is the crossing of interests and insights that makes conversation fruitful.

Reflective practice, which this paper illustrates, is another kind of research practice on which I have leaned heavily. At its simplest this is a matter of exploring, as one is working, how one's way of working is going: asking what is helpful, what is unhelpful, what might be worth experimenting with, etc. Papers like this, formally reporting the results of reflective practice experiments (node 32), are an opportunity to step back and consider what is particularly salient, what are the more general lessons of one's experience.

Because environmental management has practical goals, research practice needs to be disciplined by practical needs rather than, for example, disciplinary boundaries (cf. Toulmin 1977) or administrative responsibilities. I have found, for instance, that it is valuable to support a kind of ‘natural history’ sensibility (node 36) alongside commitments to more formal technical and scientific research (node 35). My experience is that field ecologists have a feel for places that they cannot express through the formal modalities of scientific writing, but which nonetheless can make a rich contribution to policy discussions. At Wyong encouraging a natural history approach paid many dividends. These ranged from discovery of a major engineering design flaw affecting drainage works discharging into a major wetland, to a richer qualitative appreciation of catchment-lake dynamics since European settlement [61].

A broad understanding of research—one that includes natural history, reflective practice experiments, and informal explorations alongside more traditional research practices—can be helpful. More fundamental than the range of practices is, I think, curiosity: a pleasure in enquiry, an affectionate interest in understanding.

3.6. Integrating Uncertainties into Strategies (Nodes 17 to 22)

Managers are always working with uncertainties. In environmental management, uncertainties loom particularly large because our understanding of many of the socio-ecological systems we are ‘managing’ is relatively sketchy.

In my practice, my emphasis on different ways of working with uncertainties has shifted, led by the difficulties I have encountered. Early in my practice a classical Adaptive Management approach (node 20) played a large role: looking for resilient strategies (e.g., preferring management interventions that deliver both water quality and farm business benefits, because they make sense in worlds where improved catchment management has ecologically significant effects, and in worlds where it doesn’t), and undertaking management experiments. I emphasise resilience as much as ever, but formal management experiments (node 33) rather less. We tried a number. Small scale experiments with weed control were informative. We came unstuck, however, when we tried to measure the inshore effects of small constructed wetlands installed on the lake edge. The experiment was designed for a location where hydrodynamic modelling suggested an effect would be observable. Political considerations led to it being shifted to a location with much less favourable hydrodynamics. Then the local community in the new location objected to artificial wetlands being placed on their foreshores, and road construction in the drainage catchment complicated the experiment. Overlaid on these difficulties were internal tensions over roles, and problems with innovative field techniques. We didn’t resolve our management questions; the experiment was a complicated, partial failure. What this underlined for me is something that with hindsight is probably rather obvious: the difficulty of doing management experiments in multiple use landscapes.

Adaptive Management works with uncertainties proactively. Another approach I have employed is to plan less, and work with the unexpected in a more responsive way (node 19). Politicised processes driven by non-local politics are illustrative. Decisions regarding locations for forestry and for long term conservation in National Parks have been and are made at State level, for example. Working within a local government authority gives little influence on these decisions, so a primarily responsive stance makes sense.

In some contexts, even a responsive stance feels ambitious. Working to sustain the Tuggerah Lakes, the most daunting difficulty was the high level of uncertainty we confronted as we asked ourselves: should we make a major investment in catchment management (especially in retrofitting drainage infrastructure to include water quality treatment) in the hope of substantially improving the lakes’ health: i.e., to reduce the frequency of macroalgae and phytoplankton blooms, to catalyze shifts from muddy substrate back to sandy substrate, etc.?

The local community had already made major investments in water supply infrastructure and in reticulated sewerage, so filling out the urban water cycle infrastructure picture by investing in drainage

line retrofits to integrate water quantity and quality management was something we could contemplate in principle. However, with water supply and sewerage, the incremental benefits to local people of each tranche of investment were very clear. With the lakes, the dose response curve was only vaguely understood; we were unclear whether an investment in the order of \$100 million would in fact produce a substantial shift in the character of the lakes. This led us, perforce, to a precautionary approach (node 18): doing our best to avoid further decline by requiring new urban areas to be water sensitive, and making modest investments in urban drainage retrofits and rural catchment management to reduce the risk of net negative impacts if our water sensitive urban design program for new urban areas fell short of expectations.

An Adaptive Management approach is quite proactive; an evolutionary approach is more responsive; a precautionary approach is more a matter of keeping one's head down: approaching development cautiously. Leveraging this experience to orient in new circumstances, I work with this spectrum as a palette, with its elements functioning more like ideal types (after Weber 1949) that hybridize and evolve, than as discrete choices; integrating uncertainties into strategies is easier.

This palette fails me from time to time, and I find myself resting in uncertainty: not knowing what will be helpful, and so working from a very open exploratory position with few assumptions about what is appropriate (nodes 21 and 22).

3.7. *Designing Innovatively (Nodes 23 to 26)*

Goals like sustainability and conservation are in an important sense conservative. The ecological goals they imply derive from the way things are or the way things were. In many landscapes, these are unattainable, except in limited respects. The catchment of the Tuggerah Lakes, for instance, includes one of Sydney's four major growth areas. I found myself making two major gestalt shifts as I worked to sustain terrestrial biodiversity and aquatic ecosystem dynamics here. The first was an appreciation that in various ways we are making new kinds of ecosystem, as we pursue development agendas; we may find "sustainable development" is an oxymoron—a catalytic paradox, rather than a resolvable design goal. The second was an appreciation that we could embrace this difficulty and, instead of setting design goals conservatively, we could look for new kinds of ecological reality to aim for, intending that this will produce better outcomes than aiming for a more conservative goal and failing.

Terms like "agroecosystem" and "urban ecology" remind us that we may be creating new kinds of ecosystem. The Tuggerah Lakes, however, are often seen as a relatively 'natural' water body. They are an estuarine lagoon system with a surface area of approximately 80 km² and an average depth of approximately 1.8 m. However, its catchment includes substantial areas of urban development, forestry and agriculture; around 140,000 people currently live in the lakes' catchment, and the population is growing fairly rapidly. The catchment currently holds the lakes well away from their pre-European settlement state: in a condition with no parallels in pre-European settlement ecological history. The lakes' macroalgae and phytoplankton are regularly 'fertilized', and sediment flows are substantially larger. The lakes are not analogous to wilderness; they are more like rangelands or croplands.

Appreciating this was one catalyst for reframing some of my ecosystem management work as a matter of shaping, influencing, new kinds of ecosystem, a reframe which invites more open exploration of what kind of ecological patterns and dynamics to aim at (embracing making new ecologies: node 25). At the scale of the whole catchment-lakes system we settled on something akin to "maintaining the lakes' currently modified state": using water sensitive urban design to shape the future pattern of catchment inputs so that it is roughly similar to the current pattern. At a finer resolution this approach has suggested interesting design possibilities. For example, working with a 600 Ha wetland with an urbanizing catchment—a wetland with significant history of impacts, but high conservation values—we recognised that 'restoring' many areas of the wetland to an approximation of their pre-European dynamics was out of the question, but that by looking at the tapestry of more natural dynamics within this and other wetlands in the region, we could design a catchment

management regime that would support many of the areas of the wetland remaining in or returning to a naturalistic regime.

Another support for innovative design has been placing myself in the shoes, so to speak, of places and species: for example, looking at a catchment from a natural wetland's perspective to ask what hydrological dynamics, nutrient inflows, seed inflows, fire regimes, etc. make sense if we look to this catchment to support the kind of dynamics that have prevailed in this wetland previously. This led to new urban design standards that involved efforts to mimic the wetting and drying cycles in runoff from an industrial estate, for example. Another fruitful example was looking at a landscape that is now a patchwork of bushland, farmland and urban areas from the perspective of a threatened plant species, and appreciating how while conserving this species in its current locations, we also needed—at the least—to improve the permeability of the landscape to its seed dispersal and colonization processes for it to have a reasonable chance of survival in the long term. This led to looking holistically at drainage lines, road reserves, parks and gardens as a matrix to support infrequent dispersal, and thence to shifts in Council maintenance practices, to work with garden clubs, etc.

This gestalt shift arose from recognizing (i) that we experience a kind of alive openness, in the first person, and (ii) that we and all other species are a product of evolution from a singularity, the origin of life on earth, then (iii) some kind of proto first person point of view applies to all living beings—something of this kind is constitutive of being alive (kinds of freedom: node 24).

This gestalt shift (experiential ecology: node 26), as the above policy thinking illustrates, clearly works as an heuristic. If we generalize the sensibility models illustrated in this paper to the lives of animal species, it suggests the possibility of developing a kind of experiential ethology, through an appropriate hermeneutic process.

4. Discussion

This research offers us much less than one might conventionally expect: it does not offer a working draft of what is essential to good ecosystem management, or even an assertion of what is generally necessary grounded in analysis of multiple cases. It offers instead some points of reference for practitioners that they may find helpful: annotations of a substantial body of practical experience that highlight possibilities a colleague has found it helpful to bear in mind as he works.

If, tacitly, we hold out the hope of providing a complete description of what is essential to ecosystem management, this will feel like a very modest contribution. If on the other hand we hold the view that there is no totality of good practice to be described, rather there is an evolving body of practice that is united by an evolving family resemblance (diverse practices fitting diverse situations) not by essential features, then its contribution is more paradigmatic.

The model (Figure 1 and its supporting notes) flags contributions that kindness, an entrepreneurial approach, working developmentally, collegially and collaboratively, and designing innovatively can make, and it invites sensitivity to how these cross with each other in particular actions. It thus documents the 'feel' of practice more than is usual in the literature (Table 1). More could be done here. Humility [26] (p. 353) and humor [24] (p. 353) don't make explicit appearances, for instance.

However, the model doesn't just document the 'feel' of practice. It invites readers to savor their own feel for what may be relevant, and to let that cross with the model, because only by doing this can one read a diagram like Figure 1 as a model of a sensibility. One needs to put oneself in the shoes of a practitioner and consider (play with, try out, . . .) this set of differentiations as a support for orienting oneself in such situations. This is a particularly active form of reading: heeding one's own feel for such situations and asking how the modelled differentiations may be relevant in them, noticing: what is illuminated? what is interestingly different? what does this model miss entirely? This approach directly invites ongoing experimentation and varying, not copying. It models an exploratory approach and supports skillful improvisation: sensitively feeling one's way into the potentials and possibilities of situations, ongoingly, as one acts.

In Schön's [7] (p.28) terms, the findings of this action research program are a support for navigating "in the swampy lowlands, (where) problems are messy and incapable of technical solutions": an inherently tentative support, because our methodological assumption is that readers will use these findings as opportunities for "reflective transfer", not as prescriptions to be adhered to.

4.1. Modelling Sensibilities

Singling out sensibilities as a research focus, in a research program focused on practitioners' first person experience, is helpful in a number of ways.

4.1.1. Generalizing Modestly: Between Cases and Universals

As we noted in the Introduction, an intuition that guides much of the research literature in environmental management is that what is essential to, or a general characteristic of, environmental management is what it is important to identify in research processes. In the summaries of ecosystem management analyzed here (Table 1), the elements of ecosystem management practice identified are ones that are intended to be always present (principles followed, standards met), or present most of the time (goals adopted, tools used, activities undertaken, factors present), when ecosystem management is being done properly. Similarly Westley [26] aspires to identifying the "essential" and "critical", as she works on a rich individual case.

Figure 1 is pitched at a different resolution. It provides a description of ecosystem management practice at a level of generality between the particularity of the individual case and a general model of ecosystem management, because it is an explication of a practitioner's sense of what may be relevant and may be helpful in certain kinds of situation.

By working at a middling resolution, this way of modelling ecosystem management practice invites us to notice matters that won't be mentioned if we only set out to document essential, or nearly universal features, but which are nonetheless worth underlining because they will be relevant. Some of particular interest are:

- embracing the fact that we are bringing historically new (i.e., distinctive) kinds of ecosystem in to being, when this is in fact the case (Figure 1, node 25);
- working to develop a community's capacity to participate in local political life wisely (node 12);
- formal analysis of stakeholders' interests, negotiating power, etc. (node 28);
- explicitly looking at how landscapes, management practices, policy proposals, etc. are experienced by a species or a 'natural place' as a heuristic for conservation planning (node 26);
- using reflective practice intentionally, and formalizing some of that sufficiently for this to be framed as practice research (node 32); and
- fostering a natural history approach to species and spaces, alongside field ecological research and systems ecology, for the distinctive interests and sensitivities that it brings (node 36).

Letting professional sensibilities determine the level of generality of analysis thus leads to models of environmental management that better reflect the breadth and diversity of environmental management practice.

In part the breadth is obvious from Figure 1. But it is also true that Figure 1 only scratches the surface: it implies a very wide range of processes. For example, "designing and using an organisational management system" (node 3) may involve many practices, many more than capacity building. Community development (node 12) is similarly broad, as is "functioning as a change agent" (node 16; indeed to function as a change agent one might use all the practices noted here, and more). This breadth and diversity underlines something fundamental about ecosystem management: because our goals are practical, whatever is helpful has relevance. The demands of the situations we are working in are primary. Characterizations of ecosystem management (e.g., Table 1 and Figure 1) are secondary: useful when they are enhancing our sensitivity to possibilities in particular cases, and unhelpful when they are constricting us or distracting us.

It is this pragmatism that accounts for such models' apparently uneven depth. Why, for example, should a model of ecosystem management practice single out "capacity building" (node 5) for special mention while leaving most aspects of organisational management systems (node 3) unexplicated? The reason here is that we found that it was the single most effective change management intervention—when done leveraging actual projects—that we undertook at Wyong. Depth of explication in such diagrams and their supporting notes is pragmatic across the board: it maps to one or more practitioners' experienced relevance. There is no universally correct resolution of explication. Situations differ, and practitioners' needs differ (e.g., as a general rule, novices benefit from more explication of basics, and less explication of nuances, than experts). The models work if they support reflective transfer well for a tranche of their readers.

Models of know-how of this kind are tools for the kind of situationally sensitive practice that Brunner [6] (p. 152) calls for. They are a better support for development of understandings of, and approaches to, the singular (" $n = 1$ ") situations in which we work, than a (near) universal model of good practice. Lists of widely relevant practices are a starting point but may miss much of what is most relevant in a particular case. An exploratory sensibility that is attuned to the distinctiveness of cases and aware of many possibilities is a more powerful starting point.

Also, claims that 'x is helpful', and 'x is usually helpful', are far harder to establish than claims that 'x may be helpful' or 'x may not be helpful'. The number of cases used in studies like Keough and Blahna's [22], four, and Pirot and others [19], twenty-four, and Walter-Toews and Kay [20], an unspecified modest number, is far too small to support quantitative assertions of what is always or usually helpful. In fact, when such claims are made, they are made leaning on (i) wide experience within a tradition of practice, and/or (ii) logical implications of widely accepted premises. It seems to me that intellectual rigor demands that we generalize modestly: asserting what "may" be helpful rather than what "must" be done.

Sensibility models can be developed and strengthened far beyond the proof of concept offered here. As with expert systems, crossing multiple practitioners' experience strengthens the model. Additional intricacy emerges as additional expertise is drawn on, and the set of possibilities widens. Of course, practice traditions can be radically mistaken, and further experience may reveal this and lead to improvements. The underlying contribution of sensibility models is to make the understanding that develops in professional practice easier to share, creating a medium through which learnings from reflective practitioners' (often informal) experiments can be documented in a way that respects their complexity, situatedness and (as guidance for others) tentativeness.

Practice traditions can develop subtle ways of dealing with various kinds of difficulties and opportunities, but these are difficult to convey in conventional descriptions of practices. Sensibility models offer a way of pointing to the sensitivity to possibilities that develops in traditions of practice that are disciplined by practitioners' ongoing consideration of what is helpful in practice. Know how will continue to evolve—and indeed coevolve with the circumstances practitioners are encountering. Expertise is not omniscience. The sensibility model offered here can be developed through reflective practitioners experimenting formally and informally with variations to their practice [7,13,30] and their experience of what is and is not helpful being incorporated in revised, alternative or supplementary sensibility model(s).

4.1.2. Conveying Practice's Coherence

We can characterise ecosystem management by differentiating:

- principles and tools (Pirot and others [19]),
- goals and characteristics (Bengston and others [21]),
- factors (Keough and Blahna [22]),
- standards (Natural Resources Commission [23]), and
- activities (Waltner-Toews and Kay [20]).

Such lists help us convey complex practices by breaking down a complex whole into assimilable chunks, and they are useful as checklists for practitioners. However, the logic of the practice—the sense of how each element fits with the others as part of a coherent overall approach to situations—is not well held in these kinds of model. Principles and goals provide orientation; tools and activities are for use when appropriate; standards inform evaluation, amongst other things. When it comes to shaping integrated practice, practice that is sensitive to its whole context (as best we understand it), lists like these provide very limited help. Most of the complexity of creating an holistic, situationally appropriate practice from these elements is left to the reader. Integration is acknowledged in case descriptions, but often not explicated. The Natural Resources Commission addressed this difficulty via a generic requirement that an organization following its Standard for Quality Natural Resource Management be able to provide

“Evidence to demonstrate that the application of this component has informed and been informed by the application of the other components [of the Standard]” [23] (p. 9ff)

If it wished to demonstrate that its practice conformed to the Standard. This requirement points clearly to the need for integration, but of course conveys very little of its character.

Flow charts provide their readers with much more information about when a particular practice is likely to be helpful, however for describing complex practices like ecosystem management they are deeply problematic. Their two major problems are:

1. Their logic relies on an exclusive “or”: one goes down path A or B, not both at the same time. That rule suits some kinds of practice, but not astute practice in socially complex situations, as Evan Karel underlines [26] (p. 337,353).
2. Their grammar implies that the steps noted are sufficient to reach a particular end point. Such a claim far exceeds our capacity to specify decision spaces in ecosystem management. We don’t know enough about what may be relevant in the cases of interest to readers to make that claim in a general model.

Models like Figure 1 avoid the problems flow charts have representing complex practice by using a different logic, and provide far more help with integration than conventional descriptions (Table 1). To understand them one has to read them using their grammar (“perhaps finding”, “perhaps implying”, arrows) as a reminder of their unusual underlying logic, as outlined in the Methods section. In these diagrams, particularly important lines of relevance are highlighted with arrows, and key points of reference for practitioners orienting themselves are marked with “perhaps finding” nodes. They convey coherence by supporting three kinds of reading:

1. Following the arrows to get a sense of what a particular practice commitment involves. For example, all of Figure 1 is an explication of what working to sustain a number of places in eastern Australia has involved (sustaining places: node 1). Recognising that ecosystems integrate influences from many stakeholders, i.e., that we are interdependent (no-one has control: node 8), meant negotiation had a central role in our ecosystem management work (negotiating alignment: node 9). For us a level of managerial discipline (designing and using socio-ecological and organisational management systems: nodes 2 and 3) was essential—establishing plan-do-review loops, explicit responsibilities for actions, etc.—both to keep ourselves focused, and to keep faith with other stakeholders. Shaping these management systems involved working through a number of difficulties, however (uncertainty: node 6): tensions between stakeholders’ interests, uncertainty about how best to measure performance, and ambiguities regarding cause-effect relationships, for instance. We found a wide range of orienting practices were relevant (orienting ourselves: nodes 7, 27–36). We also became advocates (advocating for a project or technology: node 14), because parts of our organisations had difficulties adopting new approaches to urban water management and to biodiversity conservation, for example (something missing: node 13). Mulling over the whole diagram, along these lines (substituting one’s own examples), conveys a sense of the diversity and richness of ecosystem management.

2. Tracing arrows backwards from a node to a diagram's root implying (node 1) to understand a practice's underlying intent. For example, we undertook some natural history research (orienting ourselves: node 7; natural history: node 36 [61]) into catchment-lake dynamics because scientific field work researching the systems' dynamics reached back only to the 1960s. Because we had limited funds, we opted for a model that triangulated oral history (because of its openness and accessibility), a review of historical records (a corrective for distortions of memory), and explication of models of system dynamics from the research literature (a corrective for residents mistaking correlation for cause and effect, etc.). One of our difficulties was that we were unsure whether the increase in the extent of muddy areas in the lakes, replacing sandy bottoms, was a reflection of the urban development process or part of some long term catchment-lake dynamics, for example related to rainfall variability (uncertainty: node 6). This affected how we worked with the local community to set priorities and how we invested in environmental management. If we take this experience as exemplary, research questions funded will be those that illuminate the design and revision of socio-ecological management systems (node 2) and arise from a commitment to sustaining places (node 1).
3. Recognizing that one may be 'in' multiple nodes at once, crossing them to shape situationally appropriate action: 'doing many things at once'. For example, we used the oral history work just described (node 36) for community development (node 12)—listening to people, sharing what we learned through reports and a book—and we used the book's launch to strengthen local political support for improved catchment management. Similarly, recognizing that our organization had poor skills in water sensitive urban design (something missing: node 13), and committed to changing this (functioning as a change agent: node 16), we decided to use actual projects (using an organisational management system: node 3) as capacity building processes (capacity building: node 5). So, having committed to development of a new district centre, we engaged consultants to facilitate multi-party, multi-disciplinary internal workshops to involve a wide variety of staff in the design process, enhancing many professionals' know-how and developing internal networks, for instance. These examples illustrate ways multiple nodes may be 'crossed' in the shaping of one activity. Various crossings arise organically because we are working from a feel for what is needed, which is inherently holistic (without in any sense being 'complete'). Exploring ways of crossing nodes deliberately is a way of catalyzing innovative practice.

4.2. *Researching a First Person Standpoint*

The effects of focusing in a disciplined way on first person experience are somewhat subtle. The difference is not primarily a matter of content. Sustainability and conservation goals, adaptive management, collaboration, scoping, systems analysis, implementing, monitoring and evaluating are as important as ever, for example. The difference is primarily in the relation one takes to a situation. Within first person experience, issues like taking responsibility for outcomes, being situated and therefore continually choosing (acting and not acting are both choices) and running up against the practical limits of one's powers are foregrounded.

4.2.1. *Foregrounding Personal Responsibility for Change*

In most discussions of ecosystem management practice (e.g., Table 1), practitioners' personal commitment to effective action is taken for granted. The texts' implicit stance is that practitioners will, on reading sound advice, act on it in a professionally responsible way. Tacit appeal to norms of professional conduct—that one "ought" to do what is advised, to the extent that it is relevant and helpful, etc.—is both intellectually reasonable and rhetorically effective. When we make this assumption, analysis, collaboration and management (Table 1) stand out as the main kinds of action needed to manage socio-ecological systems sustainably. However, when we shift our frame and focus on the first person experience of situated practitioners—looking forward within one's own particular circumstances—practitioners' relationships to their situations are problematized. The usual norms

assume that a measured, collegial stance will be appropriate. It may not be. One can ask when and how it is appropriate, and when and how other stances are appropriate. Getting organizations and networks into alignment with sustainability goals may be very difficult. A vigorous, entrepreneurial approach may be more appropriate than a measured, collegial stance, for example.

Once we problematize a practitioner's relationship to their circumstances, many questions arise that it is difficult to articulate when we are tacitly assuming that practitioners will adhere to conventional norms of professional practice.

When we ask the question 'what ways of taking personal responsibility for change are open to practitioners?' it is clear that there are many possibilities. If we imagine a person and their situation as radically independent of each other, we can talk of practitioners taking responsibility for more or less of the change that is needed, more or less intensely. The matter is more complex than these quantitative contrasts convey however, because persons and situations are mutually defining. A negotiation lived courageously is quite different from a negotiation lived timidly, for instance: the issues and opportunities differ markedly. A research agenda opens up here. Some of its questions are as follows.

1. Can we elaborate a typology of ways of taking responsibility for situations that practitioners will find helpful—an outline of ideal types that practitioners can be cross in actual situations in diverse ways, or depart from innovatively in fresh ways? That is, can we develop a typology that is not a totalizing typology (not comprehensive, complete or final) but that is helpful for orienting oneself? This is an enquiry that could move in multiple directions. In the literature, decisions by particular individuals to champion particular changes in approach are often recognized inductively as very helpful [62–64]. There are many ways to champion. Gunderson and others [65] (p. xii) differentiate the “creatively destructive” outsider who challenges accepted approaches, the “loyal heretic” insider who works internally to help organizations to change, synthesizing “gray eminences” who lend their professional authority to needed changes, and participants in professional networks who foster informal communities of practice around changed approaches, for example. One person may play multiple roles of course. Another line of enquiry is to ask: What differences in where people are coming from are relevant to how they work to sustain socio-ecological systems? How does coming from kindness, love, duty, fear, boredom, being burnt out, or self-interest affect the quality and effectiveness of what we do? Highly differentiated accounts of where we are coming from are possible:

- each of “kindness”, “love”, “self-interest”, etc., is capable of extensive further differentiation;
- we may be coming from some complex crossing of various of these or other ‘grounds’; and
- the “crossing” may be a principled, insightful integration, or a confused amalgam, or ...

So, we can ask: what differentiations amongst the ‘root implying’ that practitioners are coming from are important, under what circumstances, when it comes to characterizing effective, skillful practice?

2. A second family of questions is: How does one tell what ways of taking professional responsibility ‘fit’ particular circumstances?
3. A third family of questions is: How does one shift where one is coming from oneself, and when is it important to do so? And similarly, how can we evoke different stances in our colleagues and in our networks, and when is it important to do that? Many of the classical texts in environmental studies are classics because they evoke shifts in stance. Leopold's “land ethic” “enlarges the boundaries of the community to include soils, waters, plants, and animals, or collectively: the land” [66] (p. 204). Schumacher's [67] (p. 47) “Buddhist economics” evokes a commitment to “right livelihood”, to “simplicity and non-violence”—“exploitation [of non-renewable fuels] at an ever-increasing rate is an act of violence against nature which must almost inevitably lead to violence between men”. Berry identifies “the great work” of our time as “moving the human project from its devastating exploitation to benign presence” [68] (p. 7).

These questions can be addressed by researching practice with practitioners, explicating their first person experience of what is possible and helpful, to produce models of exemplary sensibilities—models that practitioners can taste, ingest and digest in any and whatever ways they find helpful. These kinds of question are at the margins of environmental management literature. In other practice traditions where reflective practice plays a larger role, e.g., education, nursing and psychotherapy, they have been researched more extensively [69–72]. Insights from those disciplines have relevance to building richer models of first person environmental management practice. Walkerden [17] provides some illustrations of this crossing.

4.2.2. Foregrounding Difficulty and Uncertainty

The difficulties of managing places sustainably come sharply into focus when we research practitioners' personal experience. Some illustrations are: At Wyong, we had a poor understanding of the dose / response curve for investments in water quality treatment to improve lake health, compared to our understanding of those curves for investments in water supply and sewerage (large uncertainties: node 17, Figure 1). We couldn't justify a major investment. On another occasion, a major effort to catalyse public debate on sustainable pathways for a coastal region was derailed at the last minute by a political realignment. Evan Karel talks resonantly of "a change in the legal system that was not anticipated [. . . that] increased conflict between the two groups (Native American and fishermen) and made building informal bridges unlikely" [26] (p. 351), and of "huge people turnover" leading to collapse in support for a project, and thence to the project being shut down [26] (p. 348). Unexpected difficulties: scientific, political, legal, managerial, . . . ; actual cases are always intricate and often surprising.

Failure is part and parcel of working to sustain socio-ecological systems. Ecological history tells innumerable stories of decline [73–75], and new aspects of failure are discovered frequently e.g., [76–78]. To keep faith with practitioners, the literature on management practice needs to reflect this, reporting the high level of difficulty we often encounter in delivering on our aspirations. Faithful explication of difficulties presents opportunities:

1. it exposes the weaknesses of current models of ecosystem management practice, inviting further innovation;
2. it may catalyze development of "self-care" practices for practitioners, resonant in some ways of the practices used to avoid and mitigate burn out in the helping professions; and
3. it helps novices relying on university training to orient themselves for the realities of their professional lives.

The literature has a patchy track record of representing difficulties accurately. It is not uncommon for public sector management guidance to use a 'rhetoric of unreasonable hope'. The Natural Resources Commission's [23] Standard for Quality Natural Resource Management illustrates this by presenting as achievable a standard that requires practitioners to "maximise effective contribution to broader goals", explore and pursue collaboration "wherever possible", and manage "all identifiable risks and impacts to maximize efficiency and effectiveness, [and] ensure success" [23] (pp. 10,11,14, emphasis added). Waltner-Toews and Kay's [20] (p. 1) comment is more realistic and aligned with the conclusions drawn here:

"Managing eco-social systems in the service of sustainable, convivial human society [. . .] is itself a complex activity. No straightforward program or method of social or political organization will take us from here to 'there'. Indeed, we cannot easily define what 'there' is."

5. Conclusions

This study demonstrates that undertaking action research and explicating a participating researcher-practitioner's sensibility is a way of researching environmental management practice that produces models of practice know-how that meet the criteria outlined in the Introduction: models . . .

- that are grounded in cases, stay close to practitioners' personal experience, and are faithful to practice;
- that model complex practice skills, such as acting simultaneously as scientist, politician and manager;
- that convey the 'feel' of practice, not simply recipes for action; and
- that use a kind of logic that cues reflective transfer, and so is helpful across a wide range of situations, from working in circumstances quite similar to those researched, to working in circumstances that are very different.

Models like this help practitioners orient themselves in the specificity of each situation. Schön [7,12], Forester [14], Brunner [6] and Shotter [15] have underlined the importance of that.

For readers with an interest in shaping environmental management practice in particular places, the model is a decision-support tool: not a definitive guide to how to practice, but rather a support for reflective transfer: a tool to use when thinking into what might be at stake and what it may be helpful to do.

A wide variety of ways to carry forward this kind of practice-based research into what kinds of practice are effective are suggested by the findings reported here. These can be grouped into two layers:

1. working further on the distinctive edges foregrounded by focusing on first person experience, and sensibilities in particular, for example:
 - investigating ways in which practitioners take personal responsibility for catalysing change, and ways of evoking that in practice communities; and
 - close consideration of the kinds of difficulty that practitioners experience in the first person, taking this as a catalyst for the design of practice innovations; and
2. practice research questions that emerge from consideration of the many specifics of the research findings, including:
 - expanding accounts of functioning as an ecosystem management change agent;
 - policy research using the triangulation of political, managerial and socio-ecological analyses outlined above;
 - development via further innovative practice of the capacity building model outlined above; and
 - policy design work that takes further the embrace of our de facto commitment to creating new kinds of ecosystem (investigation of "re-wilding" [79] is an illustration of the kind of research that this study lends support to).

We cannot provide definitive models of practices where a practice tradition is evolving, *a fortiori* where it is co-evolving with the socio-ecological systems in which it is embedded, and where each circumstance in which a practitioner works makes distinctive demands that require at least some measure of improvisation. What we can do is document our evolving practice traditions in ways that invite sensitivity and appropriate improvisation. The model provided here is a contribution to this research program.

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