Prototyping for Successful Conservation: The Eastern Barred Bandicoot Program

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Prototyping is a proven strategy to solve complex, challenging tasks like those posed by endangered species recovery efforts. Prototypes are small-scale, exploratory interventions in social or policy systems to implement a trial change, such as changing people's assumptions about how they should interact or who should share what kinds of power. With the primary goal being to gain information, prototypes are structured as innovative, interactive processes for active learning. They are the creative, corrigible initiatives that, if successful, can provide the basis for structuring later pilot projects. Prototyping thus is a means of upgrading professional and organizational practice and knowledge in general (Lasswell 1963, 1971a). Our experience on three continents shows that the prototyping strategy has not been employed explicitly or systematically in endangered species conservation to date, despite the significant improvements it offers to our collective conservation efforts.

In this paper we introduce the prototyping strategy using the Australian eastern barred bandicoot (*Perameles gunnii*) management program as an example. We offer five prototypical considerations that we believe are transferable to other endangered species programs.

Prototyping: Theory and Use in Endangered Species Conservation

Prototypes are innovative approaches to problems that are geared toward development of a model on which to base future actions or programs. The underlying philosophy was presented by Lasswell (1971b:192): "The approach described here is especially pertinent to the aspiration of all who would innovate fundamental changes. The aspiration toward relevance implies the will to grasp and change reality. Programs of this kind can be expedited by the spread of a technique that builds self-correction into its every application."

Prototypes are used as a learning technique and as a template for future action; as such, they serve as exemplars or archetypes. Successful prototypes encourage other programs to adopt their fundamental features or key elements, thus providing a model for replication and continual revision (Lasswell 1963). Prototypes can be official or unofficial, and are commonly employed in the business world. For example, auto manufacturers set up prototypes of varying kinds, ranging from special problem-solving teams to experimental car designs (Westrum 1994). The prototying idea is to achieve a standard of operation that represents a new model. Once this is done, pilot projects can be carried out on a large scale. The aim of prototyping is to discover and lay "the foundation for orderly replication of the revised prototype model" (Lasswell 1963:112).

Trial changes are made in programs or policies as a way to facilitate self-observation, build insight, and enhance prospects for success. Such changes thus cannot be tightly controlled like scientific experiments, although the existence of some replicable features makes them similar to experiments. Nor can they be left solely to political manipulation and control. Their uniqueness makes them similar to case studies as a way of learning about a system. Because conservation programs lie somewhere between science and politics—their conditions cannot be totally controlled in a scientific sense, nor should they be managed only by bureaucratic officials and politicians—prototypes are particularly useful as a means of initiating changes and gaining insight about such programs.

Prototypes differ from preplanned pilot studies in that they remain more flexible and creative. The self-correcting element is key. Prototyping efforts are usually managed by a small group of researchers/initiators who are "deeply concerned with contributing to knowledge and professional skill" and fundamentally committed to the success of the project (Lasswell 1963:95). Because of the uncertainty, originality, and spontaneity in social systems, they cannot predict at the outset which strategies will be most effective. Thus, "part of the challenge of the approach is to discard and adapt throughout the course of the project" (Lasswell and McDougal 1992:896). However, they should not modify the project too quickly or too often. It must be granted an adequate trial period to develop some support, legitimacy, and "power" before being reevaluated. Even though the goals of a project may be clear, as in the clear goal to recover the bandicoot species, numerous ambiguities may persist: "Hence an aim of any prototypic study is to devise a better strategic programme" (Lasswell 1971a:190). Prototypes thus establish a process for detecting and correcting errors, a procedure for accumulating successes and weeding out failures (Brunner 1995, personal communication). In their emphasis on continual learning and creativity, prototypes require clear, detailed, and comprehensive explanations of all aspects of the prototype, including all actions undertaken (Lasswell 1971b).

Work settings characterized by high complexity, uncertainty, and conflict—which certainly describes endangered species recovery programs—benefit most from prototyping (Brewer and deLeon 1983). Several

conditions increase the probability of successful prototyping. First, all participants in the program should agree to participate, although not everyone need fully understand the exercise. Second, leadership should agree to the general principles and approach of prototyping. Third, the process must be open and creative. Fourth, top professionals should be included and their opinions respected. Finally, people involved should be interested in improving performance rather than gaining power—i.e., keeping politics to a minimum (Lasswell 1971b). Prototyping efforts may be strongly opposed by some interests that prefer the status quo (Lasswell 1963), and for the effort to be effective, participants must neutralize such opposition. Prototyping is only possible in supportive contexts not dominated by issues of power and control.

The Australian Bandicoot Prototyping Effort: A Test Case

A prototyping exercise was initiated in 1988 to facilitate the conservation and recovery of endangered eastern barred bandicoots in Victoria, Australia. While few of the program's participants were formally familiar with prototyping as such, most were committed implicitly to the idea and practices of prototyping and agreed to participate. We believe several components of our prototyping effort are transferable to other endangered species conservation programs.

Eastern barred bandicoots are relatively small (500-900g), nocturnal marsupials with thin snouts, strong curved claws, and pale bars on their hind quarters. They feed primarily on soil invertebrates and are highly fecund, with the shortest gestation of any mammal (12.5 days) and the ability to give birth every 3-4 months. *P. gunnii* once inhabited the grasslands and grassy woodlands of Victoria and Tasmania, but after a 99+% decline in range and abundance, the species is threatened with extinction on mainland Australia. Bandicoots suffer from extensive habitat alteration and degradation, predation by introduced red foxes (*Vulpes vulpes*) and feral and domestic cats (*Felis catus*), motor vehicle collisions, disease, and possibly pesticides (Seebeck et al. 1990). By the end of 1991, only 109 bandicoots were known to survive on the mainland in four populations: one in the wild, two in small nature reserves with anti-predator fencing, and one in captivity.

Throughout the 1970s, intermittent research on the species' status and distribution took place, and in the early 1980s, active but limited management commenced. Initially the recovery program was loosely organized, although a variety of conservation activities were initiated, including habitat protection and enhancement, predator control, motorist warning signs, community education, and formation of recovery teams (Arnold et al. 1990). Success was limited. In 1988, a prototyping effort was begun, including rigorous research (e.g., Clark and Seebeck 1990). A population viability analysis estimated a 100% chance of extinction of the wild population in 25 years and a much shorter mean time to extinction (Lacy and Clark 1990). Concurrently, results from annual field surveys indicated a strongly decreasing population trend. Although captive breeding and reintroductions were initiated in 1988, these populations were not self-sustaining. This combination of factors accelerated conservation efforts.

The continuing downward trends also led participants in late 1991 to call for a in-depth programmatic review of all recovery efforts up to that time (Reading et al. 1992). They looked at all factors and forces affecting the program, both external and internal: biological/technical, organizational, socioeconomic, and power/authority. The evaluation identified the following weaknesses:

(1) incomplete knowledge about many factors that were likely responsible for bandicoot decline,

(2) underappreciation of the urgency of the situation,

(3) insufficient strategic planning with specific recovery targets, timelines, and responsibilities,

(4) little information on important sociological and organizational variables,

(5) no regular, systematic program evaluation as a basis for learning and improvement.

This evaluation, a key part of the prototyping strategy, was crucial. In a cooperative, trustful, and supportive problem-solving setting, it permitted all participants to identify problems and their likely consequences. Participants examined and evaluated various alternatives to alleviate the problems. The overall prototyping philosophy provided the flexibility to adapt conservation initiatives to the actual conservation challenges quickly and successfully.

The context of the bandicoot case made prototyping possible at that time because of the relatively low profile of the program, the limited number of participants and loose organization, the willingness of participants to examine a variety of options for the future of the program, the lack of debilitating conflict, the support or neutrality of key actors toward prototyping and the concept of developing a model program, and the primary interest of most participants in program success (i.e., bandicoot recovery). Both internal and external support for the program were high. Additional support for prototyping developed as the program began meeting success.

The bandicoot recovery program was reorganized in early 1992 as a result of the group's evaluation (Backhouse 1992, Backhouse et al. 1994a). The restructuring set up a central decision-making authority and four expert teams or working groups in captive management, wild population and reintroductions, economic and sociological issues, and public relations. New work arrangements, better communication flows, and improved decision making invigorated the conservation effort. Mandatory written evaluations from all participants were discussed in monthly meetings as a basis for modifying actions.

The eastern barred bandicoot's status improved dramatically under

the program reorganization and new operations. Goals were clarified and attention was focused on a much wider array of organizational issues, for example. This resulted in a dramatic increase in both captive and reintroduced populations and in improved wild and captive management. Also, standardized monitoring was put into place, new reintroduction sites were located and evaluated, and more regular and ongoing formal and informal evaluations were undertaken. The net result was the growth of the dwindling population to over 700 individuals by late 1993 (Backhouse et al. 1994b). While recent successes bode well for the species, the eastern barred bandicoot remains far from recovered (Humphries and Seebeck 1995).

A continuing commitment to the prototyping strategy encourages adaptability of conservation efforts and eventual bandicoot recovery. But as the status of the bandicoot improves, government budgets shrink, and public support oscillates, maintaining commitment will not be easy.

Prototypic Elements Transferable to Other Endangered Species Efforts

The following lessons learned from the bandicoot prototyping effort are transferable to other endangered species programs (Clark et al. 1995).

(1) Explicitly use a prototyping strategy to guide the recovery effort. Participants should agree to use a flexible, adaptive approach to their thinking, organization, research, and management. It is likely that some conservationists have already used a prototyping approach, but have not used the term to describe their method or recognized that the theory exists. Theory on prototyping should explicitly guide each application, and as theory is more widely and successfully applied, it will gain prominence and acceptance.

(2) *An interdisciplinary, problem-oriented approach is essential.* Numerous disciplines offer useful, even necessary, knowledge and approaches for species recovery; combining them all in an effort to understand the problem is essential. This will not happen on its own. Prototyping demands an interactive, flexible effort that can integrate disciplines pragmatically. Participants need to have the skills and leadership to make this approach function successfully.

(3) Use small, flexible teams knowledgeable and skilled in the full range of concepts and methods available. Dynamic teams can address the highly complex, uncertain, and urgent challenges facing conservation programs, including things like captive propagation, reintroduction, community relations, and decision making. For the most part, teams functioned effectively in the bandicoot program as they concentrated reliable information, facilitated communication and collaboration, provided support among members, and increased performance and innovation.

(4) *Clarify goals of the prototyping exercise and establish open, accountable decision-making mechanisms.* Goals should be formally and clearly articulated. They should be set collectively by all participants, should remain task-oriented (e.g., species recovery), and should be easily measured (e.g., number of animals or populations, dates of task completion, area of habitat protected) to the extent possible. At the same time, goals should remain open and be revisited frequently to see if they are still relevant relative to progress and changing circumstances. The complexity and uncertainty characteristic of conservation programs should not preclude or rigidify conservation actions. Decision making should be a transparent, open, participative process, based on the most reliable available knowledge and collective judgment. However, clear lines of accountability must be maintained.

(5) *Evaluate all aspects of the prototyping exercise systematically and regularly.* Frequent formal and informal evaluations provide participants with the opportunity to reflect on their situations, their actions, and the outcomes and effects. The group should constantly assess how its actions are helping to achieve the overall goals and whether there are better means to reach goals. It is also important to assess how discrete actions complement each other to reduce redundancies and increase integration.

Conclusions

Prototyping is an answer to the need for innovation, creativity, and new initiatives in endangered species conservation. The recent successes in the eastern barred bandicoot recovery program in Australia demonstrate the benefits of bringing together a small group of committed people, developing a core of trust and openness, attempting to initiate small, well-deliberated changes in a program, and embracing the flexibility to adapt to feedback. The emphasis is on learning and the process is self-correcting. Small-scale innovations like this could be initiated at any level in any of the hundreds of endangered species recovery programs now underway. Again, it is a way of accumulating successes and weeding out failures, and it provides exemplars to be copied, improved, and incorporated into existing policy and institutional practices. Every recovery program can develop its own systematic approach to learning and improvement through prototyping and report its results to all those concerned with conserving biological diversity.

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Habitat Conservation Act of 1995" (H.R. 2444) makes changes in the listing process and provides for greater state involvement in endangered species conservation, but does not significantly weaken the Act's key provisions. Neither bill has been wholeheartedly embraced by conservationists, but the relatively modest proposals of Congressmen Gilchrest and Saxon have added a much-needed moderate voice to the ESA debate in the House. In the Senate, John Chafee (R-RI), a vocal supporter of the ESA, is the chairman of the full committee charged with reauthorizing the Act, and conservationists are counting on him to work for a strong ESA reauthorization bill.

In another encouraging development, lawmakers on both sides of the ESA debate have introduced bills to provide incentives for landowners to conserve endangered species habitat on private lands. For example, Congressmen Pombo and Saxton have both introduced bills to provide estate and income tax benefits for landowners who enter into agreements with FWS to actively conserve and manage habitat on their property (H.R. 2286, H.R. 2423). In the Senate, Senators Kempthorne and Chafee have expressed interest in tax incentives for habitat conservation.

The Houses Resources Committee recently approved H.R. 2275 on a 27-17 vote, but Speaker Newt Gingrich's displeasure with the bill will probably delay floor action on the ESA in the House. The introduction of the Kempthorne bill will soon get things moving in the Senate, and we have probably not seen the last legislative proposal to reauthorize the ESA in the 104th Congress. Debate on the ESA in both houses of Congress will intensify even as the likelihood increases that it will spill over into next year. Keep your seatbelts fastened.

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