45. How would you evaluate the condition of the ____(feature) ____?

    1 = Excellent 2 = Good 3 = Fair 4 = Poor 9 = No response

46. Is there anything affecting the condition of the (feature)?

    1 = Yes 2 = No 8 = Don't know 9 = No response

47. (IF YES) What in your opinion, is affecting the condition of (feature) ?

Management and Access Recommendations

48. How would you evaluate the condition of this place?

    1 = Excellent 2 = Good 3 = Fair 4 = Poor 9 = No response

49. Is there anything affecting the condition of this place?

    1 = Yes 2 = No 8 = Don't know 9 = No response

50. (IF YES) What in your opinion is affecting the condition of this place?

Above you identified specific features at this site. What would be your recommendation for protecting each specific feature?

51. Water source:

52. Plant source:

53. Animal/fish source:

54. Traditional use feature:

55. Geological feature:

56. What would be your recommendation for protecting this place?

57. Do you think Indian people would want to come to this place?

    1 = Yes 2 = No 8 = Don't know 9 = No response

58. (IF YES) Why would Indian people want to come to this place?

#9

–8–

Environmental Health

Edward Liebow

Introduction: A Special Instance of Measuring Change

If flood control dikes are built along a river's edge, and early flood warning measures are instituted in low-lying communities, will these actions noticeably reduce exposure to cholera and other water-borne pathogens?

Out of a lengthy list of abandoned factories – many of which may be leaking solvents, lubricants, and other toxic chemicals into the ground – does the lingering threat to health posed by each dictate which get cleaned up soonest, or do we let the market decide?

If hazardous industrial wastes are shipped off to a proposed regional incinerator in a sparsely populated rural area, will nearby farmers be hurt by market perceptions that their crops are unsafe to eat?

These predicaments reflect a nearly universal condition of modern existence: practically every corner of the planet is filled with environmental contamination, even the sparsely populated arid interior regions of our continents. What's more, this contamination and more systemic environmental degradation are often the legacies of internal colonialism of the largest scale. From the Maralinga and Woomera military ranges in the Australian outback to the shores of Lake Baikal in Eastern Russia, from the collapsing aquifers in the Middle East to the uranium mill tailings piles in the American South West, promoting global and national interests comes with a locally borne burden.

The burden of environmental degradation often is a threat to human health and safety, and it challenges health care institutions and notions of equity as well. It is advisable to understand the potential health consequences of decisions that may result in environmental change, as some of the environmental changes inevitably are not sustainable.

Assessing environmental health impacts, then, is a special instance of change analysis. It is predictive, it is interpretive and, because it is

interpretive, it depends on collaboration to achieve validity and acceptance among affected populations. The general aim is to predict changes in health status and health care institutions resulting from proposed government or non-government organizations' (NGO) actions (policies, programmes or projects) while still in the planning stage – that is, before the purported effects have occurred. Most assessments are concerned with specific interventions usually in the form of publicly funded economic development projects (i.e. investments in energy, water, transportation, or telecommunications systems).

Strictly speaking, in contrast with the more familiar 'evaluation research', which gauges the changes resulting from programmes already in operation, the impact assessment enterprise is anticipatory.[1] That is, a profile of a given population's health status at a given time is followed by one or more profiles formulated for a specific future time period, reflecting changes predicted to occur. Differences between the initial profile and predicted futures are then measured. In this manner, previously unanticipated consequences of a development proposal can be identified, and strategies for coping with such consequences can be devised.

In practice, assessment of environmental health impacts has turned, increasingly, to the complementary uses of quantitative and ethnographic techniques. While the need was recognized early on for predicting quantitative changes (e.g. natality, morbidity and mortality rates), appreciation is growing for the need to better anticipate changes in the quality of local well-being, including such intangible forces as barriers to developing adequate epidemiological surveillance systems and delivery of health care services. An increasingly interpretive focus on 'impacts that count' – rather than simply those that can be counted easily – has drawn ethnographers into the field in recent years.

This is not to dismiss the importance of quantifiable indicators of health status or access to health care. On the contrary, populations subject to the effects of development proposals are often medically under-served, with higher localized prevalence of chronic and infectious diseases than what is reflected in regional or national trends, heightening the importance of establishment of baseline from which impacts are to be measured.

But in the bigger picture, what are environmental health 'impacts that count?' It is not merely the change in health status that is likely to result from economic development proposals of one sort or another. The distribution of these changes – who wins and who loses – matters greatly. The sources of possible changes in health status are multiple and cumulative, making attribution of impact to a single source largely inconclusive. That is, no one can say with reasonable certainty that an

observed change in a particular person's health or in his or her ability to acquire adequate health care is due exclusively to a given environmental change. And if it is difficult to account for observed changes, it is even more difficult to predict changes accurately. Uncertain or inconclusive predictions are often dismissed, undermining local trust and confidence in the analyst's authority. The road back toward trust and confidence is built by collaboration between analyst and community, a style of engagement for which the cultural anthropologist is particularly well suited.

The practice of predicting environmental health impacts increasingly has turned to the use of qualitative data collection and analysis techniques, as local community opposition to proposed developments has persisted despite findings based on social indicator research that nothing is 'wrong', or that adverse changes are likely to be insignificant. Ethnography has been used to enrich our understanding of different viewpoints, and ethnographers have applied their expertise directly in making sure that previously unempowered communities are represented when decisions are made that affect their health and safety.

But unlike conventional anthropological research, where the ethnographer is usually alone in the field, in environmental health impact research, the ethnographer is almost always part of a multi-disciplinary team. He or she joins environmental, public health and medical specialists, frequently as the sole behavioural science specialist. Collaboration with other scientists adds a layer of complexity to the already challenging enterprise of collaborating with the potentially affected population.

The underlying premise of this chapter is that adequately predicting environmental health impacts depends upon a number of necessary preconditions. Because the impact assessment enterprise is predictive, it requires specific baseline data. Due to the same apparent need for change that prompts a development proposal, these baseline data often do not exist, or are poorly organized for the present analytical purposes. Because impact assessment work is interpretive, and because the specialists' values are a poor substitute for local insight, this work is by necessity a collaborative undertaking. 'Collaboration' in this instance means creating opportunities for direct local involvement in producing and managing baseline data and impact projections.

If the local capacity for this sort of involvement needs further development, the first responsibility of the impact assessment enterprise is to see to it that this capacity-building gets going. It is appropriate to complete a 'capacity-building needs assessment', and, as already noted, it is likely that anthropologists in particular will need to plan strategically on how to guide their colleagues from other scientific disciplines to collaborate

with 'non-specialists'. It is also likely that 'capacity-building' will not be accomplished overnight, but instead will require a sustained investment of financial and technical assistance. As illustrated in Figure 8.1, only when this capacity building is underway does it make sense to talk about the mechanics of problem structuring, methods selection, data collection and analysis activities.

Hazard identification

- Information about public and private facilities

Risk characterization

- Ability to describe contamination likely to result from normal operations and emergencies
- Existing information and ability to describe locally relevant pathways

Problem structuring

Changes in risk factors

- Pathways
- Locally relevant behavioural risk factors

Changes in service delivery and differential access

Data collection and analysis

Hazard identification

- Archival materials
- Online databases
- Interviews to establish locally relevant geographic impact areas

Risk characterization

- Contaminant characterization (magnitude, duration, timing, mixtures)

Note: In a collaborative undertaking, the crucial problem-structuring step often must be preceded by correctly assessing local organizational development needs in those competency areas (hazard identification, risk characterization, and risk reduction) most central to assessing environmental health impacts. Effective problem structuring focuses our attention on potential changes in locally relevant risk factors, service delivery and perceptions of health risk.

Figure 8.1 Organizational Development Needs Assessment

Collaboration: Two Dimensions

A singular contribution that anthropologists can make to the assessment of environmental health impacts is to generalize from the past two decades of critical discourse on ethnographic authority to a more encompassing dialogue on scientific authority and what constitute acceptable scientific contributions to health policy debate.

In a sense, the anthropologist's involvement, often in the classic role of 'culture broker', is part of an unfolding transformation narrative. At the same time that affected populations recognized the need to learn the scientific talk of environmental toxicology, health physics and hydrology, specialists in these scientific disciplines have seen their models implode, their introspection highlighted as a poor substitute for elicitation of 'values' data, and the certainty of their world view about the place of local peoples in some larger social order – diversity as inscribed in bounded independent cultural groupings – undermined.

As anthropologists, we know the talk about 'ethnographic authority'. Over the early decades of the twentieth century, there emerged what Clifford called an 'international consensus: valid anthropological abstractions were to be based, wherever possible, on intensive cultural descriptions by qualified scholars' (1988:25). According to this model of practice, a lone ranger declares the 'truth' of a complex cultural experience – eg. Chagnon 1983, and Evans-Pritchard 1940. Although they are still less frequently presented in the published literature, we also know of alternate strategies of ethnographic representation, strategies that acknowledge and, indeed, embrace the collaboration of those whose insights and experiences form the subjects of cross-cultural inquiry.[2]

Anthropologists now take it on faith that this alternate strategy of inclusion, collaboration and acknowledgement renders intelligible a more complex intersubjective reality. This is relevant to impact assessment work, because such a strategy increases the chances that the right categories of impacts will be investigated in the first place. It should be patently apparent that if the wrong problem is articulated, then even the very best of intended changes will be misdirected, and bad policy will be the result. A strategy of inclusion, collaboration and acknowledgement of indigenous insight will help assure that the 'public interest' that policy purports to serve in fact embraces a broader scope of public perspectives, particularly those held by disadvantaged groups that historically have been excluded from having adequate airing for their perspectives.

Collaborative environmental health impact research involves affected community members in planning and implementing data collection and

analysis, and emphasizes equity and respect among collaborators. Research strategies that do not emphasize community participation frequently fail to take into account local priorities and perspectives, are less likely to produce knowledge that is useful for action or planning, and run the risk of making inappropriate recommendations (Cornwall & Jewkes, 1995). Collaborative research, in contrast, recognizes the critical importance of including community members as key participants in all phases of the research process. In addition, this type of research focuses on 'knowledge for action' and on empowering communities, rather than on knowledge for the sake of knowledge or academic career enhancement.

Research projects that emphasize community collaboration have become more common in recent years and have gained attention within communities and in public health circles. Effective collaborative research partnerships have been guided by a set of principles jointly developed and agreed upon by all participants (including, for example, community representatives, government officials, and academic researchers) (Schulz, Israel, Selig & Bayes, 1998). Some or all of the following principles may serve as a guide for the collaborative process in the many environmental health impact assessment projects:

1 Affected community representatives will be involved in all major phases of the research process, including the design of the research questions and overall research approach, data collection and analysis, the interpretation of findings, report writing, and distribution of results.
2 The ultimate goal of the work is not the production of knowledge for its own sake, but knowledge that will directly benefit the communities involved in the project.
3 The process of collaborating on this project will enhance the knowledge and skills of both the community-based participants and the researchers involved.
4 The project will be conducted in ways that strengthen or enhance trust and the potential for future collaboration among the different people and organizations involved.
5 The project's findings will include the voices and interpretations of all collaborators. The findings will be documented and distributed using language that is clear and respectful to the communities involved, and in ways that will be useful for developing plans that might benefit the community.
6 The collaborative partnership will be based on values of mutual respect, open communication, and recognition of the knowledge, expertise, and resource capacities of all participants in the process.

7 If any participants experience barriers to collaborating to the extent desired, project staff will attempt to identify resources that may reduce these barriers (such as transportation resources, technical assistance, and so forth).

Organizational Development Needs Assessment

Although an impact assessment project often focuses on the likely effects of a single development proposal, the cumulative and chronic exposures to multiple health threats must not be overlooked. To fully grasp the encompassing context into which the proposed development is to be introduced, the multiple exposures need to be characterized from the local vantage point. This characterization, in turn, requires collaboration with the affected population, and to be prepared to collaborate effectively in the context of a single project often requires some fundamental organizational development. Upon first blush such organizational work may seem unnecessary, or beyond the scope of the individual project. However, the long-term benefit to the local community can be substantial, and the process of monitoring and mitigating impacts can benefit as well.

Local communities are absolutely essential partners in any collaborative venture involving environmental health activities. But they often need additional support for technical capacity building, development of institutional review boards, inter-organizational co-ordination, participation in development of epidemiology methods, upgrading of vital statistics functions, and innovative approaches to public health information/education for community members.

One critical area of need where collaboration with a public agency (NGO) and university-based researchers may be of particular value is in the development of methods for conducting epidemiological research in small areas and with small populations. Baseline morbidity and mortality trend data are rarely available for specific communities, so it is especially difficult to evaluate suspicious disease clusters. More emphasis needs to be placed on establishing relevant standard rates, methods for small area variation analysis, and even on simulations that include more lifestyle-relevant 'default' values.

In addition, impact assessment professionals need to look beyond the obvious aspects of capacity building and consider some long-term institutional approaches to assure that local environmental health interests can be promoted. First, it must be acknowledged that capacity building starts with researchers' formal academic training. National and regional public health agencies can play a key role in funding model curricula for

students in training to become public health researchers – model curricula that teach these researchers to look not only at the molecular level of risk and toxicology, but at the macro-level of cultural variation. Public health researchers need to learn that it is inappropriate at key problem-formulation stages to substitute introspection and presumption based on their own value judgements for what should be developed in collaboration with affected communities. This is not something that is learned through a one-day in-service training. It needs to be a central feature of one's formative academic experiences.

Second, multi-year funding must be available for any sustained capacity-building effort to succeed. The typical local community's experience with funding for their participation is one of careering from one uncertain planning basis to another. To recruit and retain talented staff, acquire and maintain adequate equipment, and provide appropriate role models for aspiring young community members, the uncertainties in the transfer of financial and technical assistance to local governments for capacity-building purposes must be reduced.

Last, but hardly least, development agencies and impact assessment specialists need to create an internal co-ordination mechanism among their various organizations. An enormous administrative burden is now placed on communities to deal with assorted agencies and NGOs. Shouldering this burden is more than a bureaucratic nuisance; it is a diversion of time and resources from the very purposes the outside support is designed to provide.

The organizational development needs for a particular local community can be grouped into three categories:

1 Capacity to identify environmental hazards.
2 Capacity to characterize the health and safety risks associated with these potential hazards.
3 Capacity to design and implement risk reduction measures.

A formal evaluation is not necessary, but the list of questions presented in Figure 8.2 may serve as a semi-structured guide to gauging the local capacity to collaborate with impact assessment specialists. This list serves double duty, as it also identifies the main steps involved in the impact assessment work itself.

Problem Structuring

Environmental health impact assessment work is usually derived from plans to fix the stickiest problems, the ones for which no simple, ready

1. Hazard Identification

Describe *public* facilities (such as power plants and military sites) that may contaminate areas to which the community has geographic, historical, cultural and legal ties.

- What are our relevant local library collections? Nearby libraries with information about relevant facilities?
- What is the status of our on-line record retrieval abilities?
- Who (or what agency) is responsible for maintaining relevant information? For liaison with appropriate facility operators? What qualifications are required to carry out this responsibility? What co-ordination within our community is required to do this effectively? What barriers limit the effectiveness of knowing in detail what public facilities threaten our lands?
- What information is available that our community would find relevant? What capability exists to share information? What mechanisms are needed to make this information sharing effective?

Describe *private* facilities (such as industrial sites or mines) that may contaminate areas to which the community has geographic, historical, cultural and legal ties.

- What are our relevant local library collections? Nearby libraries with information about relevant facilities?
- What is the status of our on-line record retrieval abilities?
- Who (or what agency) is responsible for maintaining relevant information? For liaison with appropriate facility operators? What qualifications are required to carry out this responsibility? What co-ordination within the community is required to do this effectively? What barriers limit the effectiveness of knowing in detail what private facilities threaten our lands?
- What information is available that our community would find relevant? What capability exists to share information? What mechanisms are needed to make this information sharing effective?

2. Risk Characterization

Describe contamination likely to result from routine operation of the proposed development, and also from possible emergencies (in terms of magnitude, duration, timing, mixtures).

Figure 8.2 Characterizing a Local Community's Capacity-building Needs

- Has prior work been done for our lands and our people in particular? Do we have access to records concerning methods and outcomes for this work?
- What else do we need to learn that we don't know already? What staff and equipment do we need to learn this?
- What staff and equipment do we need to keep a record of ongoing estimates provided by others?
- What staff and equipment do we need to verify the ongoing estimates provided by others?
- What information is available that our community would find relevant? What capability exists to share information? What mechanisms are needed to make this information sharing effective?

Describe pathways to community members' exposures.

- How well do our records document potentially significant pathways of relevance to our local territory, traditions and lifestyles?
- How well do our records document where our members were living at times when they might have been exposed in the past?
- What should be the nature of local participation in developing information on toxicology and locally pertinent pathways? Who should be involved, and what staff qualifications/equipment are required?
- What information is available that our community would find relevant? What capability exists to share information? What mechanisms are needed to make this information sharing effective?

Define relevant health outcomes.

- How well do our records document the health status of our community members?
- How accessible are these records?
- What additional information is needed to define relevant health outcomes?
- Does our community need to consult with outside subject matter experts to accomplish this?
- What information is available that our community would find relevant? What capability exists to share information? What mechanisms are needed to make this information sharing effective?

Figure 8.2 Characterizing a Local Community's Capacity-building Needs *(continued)*

Assess risks.

- Has prior work been done to estimate risks associated with specific sources of contamination?
- Has prior work been done to estimate total exposures?
- Has prior work been done to estimate the susceptibility of our people to risks from specified sources?
- Has prior work been done to compare risks from different sources, including radiological risks and risks from micro-organisms?
- What should be the nature of local participation in performing risk assessments? Who should be involved, and what staff qualifications/equipment are required?
- What information is available that our community would find relevant? What capability exists to share information? What mechanisms are needed to make this information sharing effective?

3. Risk Reduction Measures

Public health information and education.

- What documented efforts have been undertaken to date? What audiences were targeted? What techniques were used? Has the effectiveness of these efforts been evaluated?
- What has been tried? How has it worked? What would help keep it working well/make it work better?
- What sources of assistance are available that our community would find relevant? What basic capability would need to be developed by our community before we could take advantage of such assistance?

Medical interventions.

- What documented efforts have been undertaken to date? What populations were targeted? What techniques were used? Has the effectiveness of these efforts been evaluated?
- What barriers to access and utilization must be overcome?
- How does our community co-ordinate with other public health officials and private care providers to overcome these barriers?

Figure 8.2 Characterizing a Local Community's Capacity-building Needs *(continued)*

Environmental surveillance.

- What is the status of our community's environmental surveillance/monitoring programme? What area does it cover? What staffing requirements does it have? What computers and field equipment does it use? Has the adequacy of this programme been evaluated?
- What are further monitoring/surveillance needs? How can these be prioritized? What staff and equipment are needed to accomplish this?
- What sources of assistance are available that our community would find relevant? What basic capability would need to be developed by our community before we could take advantage of such assistance?

Further research.

- What work on small area epidemiological methods has been completed? Has any of this work specifically focused on our community's membership? Has any work been done on biological indicators of locally relevant exposures?
- What are further research needs? How can these be prioritized? What staff and equipment are needed to accomplish this?
- What sources of assistance are available that our community would find relevant? What basic capability would need to be developed by our community before we could take advantage of such assistance?

Figure 8.2 Characterizing a Local Community's Capacity-building Needs *(continued)*

solution can be found, the ones where the stakes are high, the uncertainties great, and the impacts broadly felt for the longest time. It should be assumed that if one starts with the wrong formulation of the problem, one will inevitably end up with bad proposals for implementing change. 'Bad' in this instance means locally burdensome, and in the realm of problems entrusted to government solution, anthropologists often engage those peoples most likely to bear the local burden of national policies, and give them credit for their insight and expertise.

In the case of locally borne environmental health impacts, the central question is how to reduce the public's exposure to hazards. Finding acceptable answers involves value-laden, conflict-riddled choices over who will bear the burden locally in order to achieve a widespread benefit.

Nuclear and chemical weapons may have served the interests of national defence and global peace, but a legacy of contamination remains. Industrial activities may also serve the interest of the regional and national economies, but here too a legacy of contamination remains, a legacy that is especially threatening to groups whose identity derives from the place where they live.

In practical terms, the issue of national interests and local burdens is one of whose values should inform the choices. Who ought to sit at the table when the big decisions get made? Too often, choices are regarded as matters of 'fact' to be made only by specialists with the right knowledge or 'expertise.' Non-specialists are labelled 'inexpert', their judgements discounted as ill-informed, politically motivated, or both. Excluding them from decisions promotes a lack of trust in the specialists, a feeling that the hazards and remedies are beyond the control of those most affected.

The problem-structuring step, sometimes called 'scoping' in the formal context of Environmental Impact Statements (EISs), should focus our attention specifically on three sets of baseline/impact categories:

1 Changes in risk factors.
2 Changes in service delivery and differential access.
3 Changes in perceptions of risk.

Changes in Risk Factors Environmental health risk factors generally are placed into two categories: pathways of exposure, and behaviours leading to exposure. A 'pathway' is the process by which an individual is exposed to a contaminant that is released from a specific source. The pathway follows a contaminant from its release (contamination source) and dispersion into the air, water, or soil (environmental media and transport mechanisms) to its point of exposure (a location of potential or actual human contact) via a route of exposure (e.g. inhalation, ingestion, or absorption through the skin). A pathway also includes the so-called 'receptor population': the persons who are exposed or potentially exposed to the contaminants of concern at a point of exposure. A development proposal may introduce the possibility of airborne emissions that will be deposited in areas downwind from a source of release, or may stir up contaminants that had stabilized in the soil after their initial deposition. A proposed hydroelectricity project almost certainly would alter the flow of river water, perhaps disrupting a seasonal process of dilution and promoting a build-up of coliform bacteria that increase the risk of gastrointestinal disease among people for whom the river is a drinking water source.

A key facet of problem structuring, then, is to make sure that locally relevant pathways are included in the data collection and analysis plan. In anticipation of cleaning up the former British nuclear weapons testing site at Maralinga, South Australia, for example, Giles, Palmer & Brady (1988) found that the Aboriginal community most likely to use portions of the reclaimed area would probably pursue a semi-traditional subsistence and settlement pattern, rather than erecting permanent buildings in the Euro-Australian architectural style. This means that the greatest exposures to residual weapons-testing contamination would not necessarily come from ingestion, but rather from inhalation and dermal absorption.

Changes in Service Delivery and Differential Access Introducing or removing contaminants alter potential local health risks, but so do changes in the delivery of health care services. A temporary construction work force may increase the demand for health care services, and place a strain on existing facilities. Alternatively, new facilities and equipment or increased health care provider staff may be introduced to accommodate increases in demand caused by development-related population growth. If these facilities and their staff are available to the local population, improvements in preventive and treatment services may result. In addition, depending on the proposed development's location, changes in the accessibility of health care services may result. Transportation routes may be altered, satellite or mobile diagnostic and treatment facilities may become available, and a proposed development's construction and operation may result in changes in health care delivery cost or rules concerning who may be permitted access to treatment.

Changes in Risk Perceptions A final category of problems to consider in structuring the assessment of environmental health impacts involves changes in local perceptions of health risks. The public health risk controversy over chemicals in the environment is rooted in the notions of 'hazard' and 'stigma'. A distinction between these two notions is appropriate in impact analysis projects.

It has been amply demonstrated that popular concerns about possible personal hazards to health and personal safety are often inconsistent with scientific evidence, where it exists, about the likelihood that such hazards will occur. An associated concern is that even if possible hazards are never realized, the mere presence of the potential hazards' source can stigmatize the locale, affecting the market for certain locally produced goods and services, and perhaps limiting future economic development opportunities (Liebow, Branch & Orians, 1993). Thus, while the notion of ecological

'hazard' is associated with the risk of health impairment, 'stigma' is associated with the risk of financial or social impairment.

Ecological Hazards

Non-specialists are said to use an 'intuitive approach' to judging hazards, in contrast with an 'analytical approach' normally used by experts (e.g. Starr & Whipple, 1980). The 'intuitive' approach relies on vivid images of hazards and devastation, often drawn from dramatic news accounts, to focus on the controllability of hazards (can catastrophic consequences be averted?).[3] Using this intuitive approach, people are relatively accurate in ranking the seriousness of hazards, but relatively inaccurate in estimating a hazard's calculated magnitude (Slovic, 1987). Unlike their specialist counterparts, the general public usually takes a number of mental short-cuts when faced with complex decisions or decisions surrounded by a relatively great amount of uncertainty: for example, decisions about unusual events that may or may not take place at some indefinite point in the future (Tversky & Kahneman, 1973, 1974, 1981). In addition, people have been found to be swayed in their judgements by the way they are asked to form them (Fischhoff & MacGregor, 1983; Lopes & Ekberg, 1980).

It has also been amply demonstrated that the general public is often told that a product or factory is 'state of the art', only to see it malfunction (e.g. Perrow, 1984). Because of this, many of us have grown sceptical, and providing us with information about the safety of a proposed development will not, by itself, remove a generally held concern that the development is a source of possible health hazards. In addition, we generally need information that will help evaluate the proponent's credibility, trustworthiness and ability to manage the development. We want to know that we are being dealt with fairly, that the local benefits and environmental burdens of a proposed development are being distributed in equal measure (Douglas, 1985; Douglas & Wildavsky, 1982; Rayner & Cantor 1987; Wenz, 1988).

Credibility, trust and fairness as factors in judgements about hazards suggest that the potential source of hazards is not evaluated in a social vacuum. A process termed the 'social amplification of risk' may be at work, where the interaction between a potential ecological hazard and its social setting may increase the impacts of technology (Kasperson, Renn, Slovic, Brown, Emel, Goble, Kasperson & Ratide, 1988). Impacts of an industrial installation or chemical application – beyond those calculated by the risk assessment specialists – may occur as information

about the possible hazard is exchanged. People receive such information either through word of mouth or through the mass media. Factors identified as contributing to the social amplification of ecological hazards include:

1 Selective, sensational, and sometimes inaccurate media reporting of risks and regulatory actions to control them.
2 The use of technical language.
3 Limits in the ability of non-specialists to understand technical information.
4 Intolerance for scientific uncertainties.
5 Failure to address the public's concerns (Keeney & von Winterfeldt, 1986).

Stigma

Researchers have argued that under certain circumstances an area might be cast in an unfavourable light, with the possibility of associated adverse economic effects, if it were to host a potential source of ecological hazards (Fischhoff, Lichtenstein, Slovic, Derby & Keeney, 1981; Fischhoff, Lichtenstein & Slovic, 1982; Slovic, 1987). The key to predicting whether a host area might be stigmatized rests with several characteristics of the potential hazard:

1 *Concealability*. Is the potential hazard hidden or obvious? To what extent is its visibility controllable?
2 *Course*. What pattern of change over time is usually shown by the condition? What is its ultimate outcome?
3 *Disruptiveness*. Does its presence block or hamper interaction and communication?
4 *Aesthetic qualities*. To what extent does the source make the possessor repellent, ugly or upsetting?
5 *Origin*. Under what circumstances did the source of potential hazards originate? Was anyone responsible for it, and what was he or she trying to do?
6 *Peril*. What kind of danger is posed by the hazard, and how imminent and serious is it?

Experiments suggest that people associate different types of industrial facilities with different levels of stigma on host regions (Slovic, 1987). Although this experimental approach has been taken to task as inadequately

representing the general population (Beach, Christensen-Szalanski & Barnes, 1987), or because of its subtly disdainful distinctions between laypersons and experts (Bradbury, 1989; Liebow, 1993), its highly suggestive results should be tested further.

Another dimension of 'stigma' that bears mentioning, although it has not received a great deal of attention in the research literature, has to do with changes in political power that come along with large-scale industrial development in rural areas. Smaller, stable communities often rely on part-time officials and a certain informal way of avoiding or resolving conflicts. Cherished by some, this political style may become a liability in the face of outside growth and development pressures. There may not have been many occasions to build the local expertise required to create development controls and interpret environmental protection regulations, and this need for capacity-building may become a source of stigma in dealing with sophisticated outside development interests.

To review briefly, the crucial problem-structuring step should focus our attention on potential changes in risk factors, service delivery, and perceptions of health risks. Collaboration with locally affected population groups is necessary in further specifying the most meaningful of these changes. Methods for doing so are briefly touched upon in the next section.

Methods Selection

The key to prioritizing potentially significant environmental health impacts for further investigation is to employ a complementary set of qualitative and quantitative data collection methods. It is almost always the case with impact assessment research that the findings will be used to organize a knowledge base that may help resolve conflicts over environmental health and safety. The richness of an ethnographic data record certainly can contribute to conflict resolution. However, it is reasonable to expect some resistance to a 'qualitative' analysis on the grounds that it lacks precision, is incomplete, inaccurate, unrepresentative, or otherwise fails to capture adequately the knowledge, attitudes, and behaviour patterns that inform local community perspectives regarding a development proponent's plans. Indeed, in one recent instance (Liebow, Bradbury, Branch, Heerwagen, Konkel & Leyson, 1998), upon initially visiting both potentially affected communities and development proponents, we were almost always asked why we were not conducting a sample opinion survey, and what we hoped to gain from our work if its findings were not generalizable, in a statistical sense, to the larger population.

Resolving complex conflicts – and expecting them to remain resolved – cannot be accomplished by referendum, especially when at least some parties to the conflict are convinced that more is at stake than judging whose chemical residue predictions are more realistic. One should be concerned that if data collection efforts take the form of an opinion survey, the results would appear to grant approval to the development proponent's plans by the principle of 'plurality rules', yet resistance would escalate. With public approval apparent, the proponent might further discount or ignore altogether those opposing its plans, who for their part would make good on their threat to appeal directly to Congress/Parliament, the courts, and other regulatory authorities. Rather than helping to reach a productive and stable resolution to this conflict, a series of local attitude/opinion surveys easily could have the opposite effect.

As indicated earlier, the main analytical sequence focuses on hazard identification, risk characterization and risk reduction. In each stage of this sequence, methodological choices are available. Selecting from among the elements in one's 'tool kit' may depend heavily on local capacity for collaboration, time, and financial resources available to create the necessary knowledge base.

Hazard Identification

The purpose of this step is to describe facilities (both publicly and privately operated) that are already present as potential sources of contamination to areas over which the community has geographic, historical, cultural and other legally protected ties. Creating such a description is necessary to establish the baseline conditions into which a proposed developed is to be introduced.

Archival reviews, either from local and regional library collections or from on-line databases maintained by regulatory authorities, offer a good start in describing existing facility operations. However, it is also necessary to collect 'local knowledge' of the area through direct interviews about 'place' in order to establish the geographic extent of possible effects from the proposed development as judged by the affected communities. As Stoffle, Traugott, Stone, McIntyre, Jensen & Davidson have shown (1991), defining what is already present in the geographic area of most likely impacts is a critical, but not altogether straightforward, step in the initial hazard identification process. Affected populations are not necessarily organized according to the political and administrative units used for government data collection, and local social organization and mobility patterns can expand significantly the geographic domain over which a

proposed development's health impacts are regarded as potentially significant.

Risk Characterization

The purpose of this step is to describe the projected introduction of environmental contaminants (in terms of magnitude, duration, timing and mixtures), the pathways that these contaminants might take to result in community members' exposures, the relevant health and safety outcomes associated with these contaminants, and the circumstances under which unhealthy exposure levels are likely to be experienced locally. Risk characterization usually requires the involvement of other specialists in a multi-disciplinary team the toxicologists, health physicists and ecologists.

It is useful for anthropologists to familiarize themselves with risk characterization procedures, and several prescriptive manuals are available to guide work at this stage of an impact assessment (for example, the United States Agency for Toxic Substances and Disease Registry, 1992). Left unspoken in these guides, however, is one of the more important contributions that ethnographic insights can make: according to what locally meaningful subgroup distinctions are contaminant pathways and exposure levels likely to vary? Government records rarely allow for designation of local identity and affiliation, relying instead on aggregate categories that overlook significant risk-related cultural and behavioural variability. The ethnographer needs to make sure that the risk characterization work on pathways, relevant health outcomes and exposure levels is framed by local sub-group distinctions. We might propose to ask, at the outset, such questions as:

1 Into what meaningful categories and sub-communities do local community members place themselves?
2 By what behaviours, meanings, attributes symbols do they maintain boundaries distinguishing between such categories and sub-communities?
3 How 'fixed' or rapidly changing are these categories and the means by which their boundaries are maintained?

Not only do the answers to these questions increase the chances of adequately capturing variability in behavioural risk factors, but they contribute the added value of increasing the face validity with which the specialists' risk characterization is presented to potentially affected populations.

Risk Reduction Measures

The purpose of this step is to determine what institutionalized capabilities exist to reduce or avoid altogether the risks to which affected communities would otherwise likely be exposed. These capabilities include institutions that can be mobilized to provide public health information and education, medical care and treatment, environmental and health surveillance, and, perhaps, additional research that will add to our collective knowledge about local health status and relevant risk factors.

One is compelled to acknowledge that the institutional landscape for risk reduction is highly territorialized, so the outsider's view of organizations and agencies that appear to be well-placed to reduce environmental health risks needs to be sensitized to the constraints with which these organizations frequently must operate. Adapting a useful model developed by Blaikie, Cannon, Davis & Wisner (1994), vulnerability to environmental health risks occurs in a progression from the proximate ('unsafe conditions') to intermediate ('dynamic pressures'), and finally to the least proximate (systemic 'root causes'). Root causes of vulnerability are to be found in limited access to power, structures and resources, and in ideologies that reinforce inequalities. Dynamic pressures are processes and activities that channel the root causes into particular forms of insecurity. Rapid population growth, urbanization, debt repayment schedules, deforestation, and declining soil productivity are all seen as macro-forces derived from underlying causes that lead to unsafe conditions for some population subgroups. These unsafe conditions may include environmental and economic fragility, a lack of preparedness, endemic diseases, and a lack of local institutions to fall back on when conditions of scarcity are exacerbated.

Effective risk reduction measures require institutional mobilization to address changes at all points along this progression, but institutions often lack the necessary scope of authority to do so. Authority to deal with unsafe conditions, for example, is often within the province of medical care providers and public health agencies. Dealing with dynamic pressures and systemic root causes of vulnerability, however, frequently is beyond the health institutions' territory, and requires collaboration between health institutions, government agencies and NGOs who do not necessarily regard environmental health risks as within their province. In the risk reduction arena then, the ethnographer's perspective must encompass a holistic look at institutions capable of being mobilized to intervene at the local level, including institutions whose terms of reference appear, on

the surface at least, to be only indirectly tied to the immediate threat of unsafe environmental conditions.

Conclusion: Where does 'Culture' Fit in the Health Risk Equation?

Ethnographic methods can contribute substantively to changing the way we evaluate development-related environmental health and safety risks, and especially in recognizing the systemic institutional relations that must change in remedying past injustices visited upon disadvantaged and marginalized peoples. No one's interests are served, however, when an environmental health impact assessment has at its foundation an ill-conceived model of culture.

If one is to argue persuasively that cultural variability affects (or does not affect) variability in environmental health and safety risks – that is, people from different cultural backgrounds are (not) differentially vulnerable to risk because of their cultural backgrounds – then a specific spot must be cleared for a well-defined notion of culture. A well-defined notion of culture, in turn, will necessarily make explicit its assumptions concerning territorial, demographic and temporal reference frames, as well as assumptions about within-group variability with respect to enculturation.

Without the benefit of ethnographic research, environmental health assessment generally views 'culture' as constituting one set of variables in an equation whose outcome is a measurement of risk. For example, Harris & Harper (1997) assume that variability in the risk of health hazards depends on lifestyle variability. A 'native American' lifestyle leads to a distinctive vulnerability to contamination threats. They also assume however, that 'cultural' group affiliation is directly and uniformly associated with 'lifestyle': All 'native Americans' share a common and distinct 'lifestyle', and equations intended to quantify the exposure pathway for a given contaminant need to modify coefficients to account for this distinct lifestyle. Embedded in this view is an adversarial approach that aims to allocate responsibility to various possible causal factors, or 'affix blame' to individual actors (like polluters) within a territorial and economic system. Placing culture within an impact assessment framework directs analytical attention to producing estimates of dose and health risk under varying development scenarios, or to producing public health messages aimed at getting people to change the behaviours that expose them to health risks in the face of inevitable development. For the purposes

of assessing environmental health impacts, it is perhaps more productive to promote an alternative view of 'culture'. From this alternative view, 'culture' is the encompassing context within which impact assessment problems are framed. Placing the impact assessment project within a cultural frame directs analytical attention to where it properly belongs, resolving conflicts over the distribution of burdens and benefits. With the focus on conflict resolution, emphasis is placed on problem-structuring techniques. The analyst's responsibility is to make sure all assumptions and uncertainties are clearly articulated, and the nature and degree of community collaboration recognized. Specialists' introspections are never an adequate substitute for observation, and specialists must relinquish sole authority for determining the legitimacy of problems allowed to surface.

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Notes

1 'Evaluation' research and 'impact assessment' research are, of course, related. A growing body of evaluation findings are available to place the expectation and attainment of desired health outcomes on a rational and reliable basis.
2 A formative standard against which models of collaborative writing are yet appropriately measured is found in the work of Bahr, Gregorio, Lopez & Alvarez (1974).
3 In contrast, the 'analytical' approach methodically relies on data from a number of less selective sources, taking into account the likelihood that a hazard will occur as well as the magnitude of its consequences.

–9–

Social Impact Assessment and Linear Projects

Richard Howitt and *Sue Jackson*

Social impact assessment research is inherently uncertain, time-consuming, resource intensive and difficult. Project advocates and development agencies that set terms of reference and deadlines for social impact studies are generally more familiar with the requirements of business deals or political compromise than demands of complex social research. In cross-cultural settings involving indigenous peoples, the need to take into account the interests of multiple stakeholders affects both the impact processes a project will generate and the way the assessment task can be approached. This chapter considers the particular case of linear projects and discusses methodological issues for meeting the challenges such projects raise. Drawing on the authors' 1998 assessment of the impacts on Aboriginal people of a proposed rail link between Alice Springs and Darwin in Australia's Northern Territory (Figure 9.1) (Howitt, Jackson & Bryson, 1998), the chapter outlines issues and approaches that facilitate better project planning, impact management, and regional development. Consistent with discussion elsewhere (Howitt, 1993), the approach outlined is participatory, empowering and interventionist. It proposes a consultative process which empowers marginalized stakeholders to understand changes likely to occur in response to a proposal, and frames a negotiation approach to address concerns of alignment, specific impacts, regional effects and general policy responses.

Linear Projects and Impact Assessment

Linear projects are those activities such as railway lines, power transmission lines, pipelines, roads, freeways and canals where project configuration involves a narrow strip of land over a considerable distance. Unlike site-specific projects such as mines and dams, linear projects always require project managers to deal with a diversity of environmental