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# The New Zealand Nuclear Impacts Study

The New Zealand nuclear impacts study, completed in August 1987, was a rapid assessment of the likely consequences of a Northern Hemisphere nuclear war for New Zealand. Incorporating "nuclear winter" findings, it provided an important new perspective on the indirect social and economic impacts of nuclear war for a noncombatant country. The study team acted primarily as facilitators and "information brokers". A consultative and participatory approach was taken for the study design and collection of information. Over 300 individuals and sector organizations responded to a scenario of the nuclear "event" from their own areas of expertise. A national public opinion survey and community-based workshops indicated the public perception of likely impacts. This iterative process brought in valuable expertise and in itself had an educative effect. The study is a useful model for assessing the impacts of complex events at a national level, particularly the resilience of key systems (energy, communications, trade) to major external perturbations.

no targets in New Zealand. Starting from the SCOPE ENUWAR research on the global climatic and biological impacts of nuclear war (2, 3), only minor physical effects were predicted for New Zealand, viz. up to 3°C temperature drops (following a war during a northern summer), and negligible radioactive fallout.

The study was initially planned as a preliminary overview of the issues, with the aim of producing a phase one report and proposals for more detailed second phase investigations. The outcome was a detailed analysis of the impacts, which revealed that a significant range of disruptions could follow nuclear war.

Funding for the study (which had a budget of NZD 125000) came from the reparation money from the French government for the bombing of the Greenpeace ship *Rainbow Warrior* in Auckland harbor. The project was carried out, under contract to the NZ Ministry for the Environment, by a 3-5 member study team working under the auspices of the independent New Zealand Planning Council.

## BACKGROUND

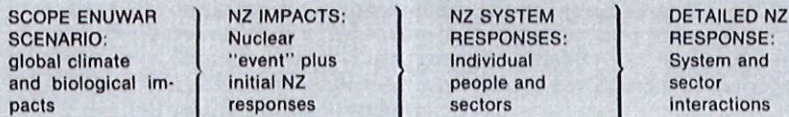
The New Zealand nuclear impacts study (1) was an innovative government funded investigation of the impacts of a major nuclear war, including "nuclear winter" effects, on a noncombatant country.

Published in August 1987, the 8-month study provided an important new perspective on the indirect social and economic impacts of nuclear war. The study assumed a largely Northern Hemisphere war, with

Wellington is the country's capital city. Survival of cities after nuclear war would be threatened if there were breakdowns in the key sectors of energy, health, transport, food production and distribution. Photo: W. Green.



Figure 1. Impact assessment by scenario building.



Following the release of the study, the Ministry arranged a three month public consultation program on the findings and proposals for Phase II. Public comments were published as a subsequent Ministry report (4). The Government recently announced its decision to proceed with some of the Phase II proposal.

## RESEARCH APPROACH

The study required a comprehensive assessment of environmental, social and economic impacts for the whole country. Impact assessment methods have traditionally been oriented to assessing major projects. Moreover, they have generally tended to overlook social dynamics (5). More recently, and especially in New Zealand, social impact assessment methods have gained greater recognition and have been applied to sector and regional changes (6) as well as major projects. However, methods for assessing the social impacts of national or global events are still in their infancy. Recent research on the impacts of global climate change (7) suggests new approaches to impact assessment, which reflect the innovative approach developed in this study.

The basic approach used was scenario building, viz. starting with known scientific facts about the physical impacts of nuclear war and applying these to other (social and economic) systems to develop a more elaborate picture of impacts (Fig. 1).

Starting with the nuclear war event and the SCOPE-ENUWAR findings for global climate and biological impacts, the basic New Zealand scenario was presented to respondents in various economic sectors and other experts who, in turn, were able to project reactions in key systems. Given more time, a more detailed NZ response could have been developed by feeding the first round responses back again for further reaction. A more detailed view of the interactions between physical, social and economic impacts could also have been achieved.

Nevertheless, this "snowballing" technique had a number of benefits. It was able to produce a substantive picture of New Zealand impacts in a very short time. Relying on individuals and their own expertise generated a great deal of information. Costs were also significantly minimized; in many cases people were so interested in the project that it was not always necessary to use paid consultants.

By taking an open and consultative approach, the study avoided being an academic exercise and became a project in

which a wide range of New Zealanders were involved. It reinforced the idea that people themselves are experts in their own areas of knowledge (be they fishermen, financiers, housewives or government officials), and can contribute valuable information. There was a two-way flow of information; people were both responding to and influencing the direction of the investigation, rather than simply being consulted or used as a data base. The role of the researchers was to act as facilitators with an overview of the whole process.

The participatory approach also increased public awareness of the study in government and the private sector. This generated an understanding and goodwill which may not otherwise have occurred, and more informed reactions when the study was published.

The study, in itself, was a valuable education program for New Zealanders on the likely impacts of nuclear war. By imagining how they would respond themselves or how their organization or economic sector would respond, participants developed an appreciation of how they fit into NZ society, how that society works as a series of interacting systems, and how those systems might break down if key supports were removed or damaged.

Simplistic ideas of the probable nuclear aftermath were dispelled and a more sophisticated view emerged. The impacts were shown to be more subtle and complex; New Zealand would be devastated by nuclear war in the Northern Hemisphere, not because of sudden, dramatic destruction, but because of pervasive breakdown of the systems and social structures that determine our current way of life.

This also has the effect, potentially, of improving the preparedness of New Zealand society for nuclear war. Without this education, public panic (based, for example, on misinformation about radioactive fallout) could severely distort the social reaction and efforts to maintain order and prioritize emergency measures. On the other hand, complacency amongst some in the community about the magnitude of nuclear impacts could lead to conflict. An attitude based on previous experiences, such as the 1930s Depression or World War II, could seriously hamper a realistic response to the impacts; a "return to normal" expectation could be counterproductive to social adjustment.

Most importantly though, the response to the New Zealand study shows that public education and discussion can also increase support for nuclear-war prevention strategies.

However, some important policy issues emerge: should effort be put into preventing nuclear war, taking steps now to mitigate the likely impacts or drawing up contingency plans for action in the event of nuclear war taking place? Opinions vary as to whether mitigation and contingency planning should take place as well as prevention strategies. This reflects important problems in impact assessment generally. Should impact assessment be used if it does nothing more than ease the effects of an undesirable proposal, or should it be used to influence decisions and prevent impacts in the first place?

We would suggest that impact assessment is an essential part of policy making, but that impacts mitigation or management can also be justified at the same time, should prevention (or in this case nuclear deterrence) fail.

Previous research on NZ community views suggests strong support for both prevention and contingency planning (8).

## METHODS

### Research Design

A 2-day workshop to formulate the design and approach for the project brought together experts in social research, impact assessment and research management. A strategy for the project emerged: it would be a scoping exercise, the emphasis would be on identifying responses at a system level and an open, consultative approach would be taken. Further in-depth consultation with "experts" was rejected in favor of consulting people whose working knowledge of key systems would provide the best indication on how these systems would cope with nuclear war disruptions. Given the limited time for investigation (some 4 months), the study team would act primarily as facilitators and information brokers rather than attempting any original research.

### Literature Review

The study team made a comprehensive review of the literature on nuclear impacts. Of particular value were the results of the SCOPE-ENUWAR project on physical and biological impacts. This provided the climatic and radioactive fallout assumptions for the study. In addition, a report by the New Zealand Commission for the Future was helpful in pointing to the likely importance of trade and economic disruptions (9).

### Scenarios

The study started with the SCOPE-ENUWAR assumptions, viz. an escalating conflict between NATO and Warsaw Pact forces, leading to attacks on military and economic targets involving the use of over 10000 nuclear warheads with an explosive force of 5000 to 6000 megatons. This represents about 50% of the total estimated strategic warheads of the superpowers.

Consultation with relevant New Zealand and international authorities indicated that it was unlikely that New Zealand would be a nuclear target.

Following this nuclear war "event", the SCOPE-ENUWAR projections for climate and physical impacts on New Zealand were adopted, to develop a base scenario for the study. The use of conservative assumptions in establishing the nuclear event was seen as a more useful way of assessing impact than assuming massive destruction, the effects of which are already well understood.

After establishing the event, the Study Team identified general preliminary impacts for New Zealand, viz. assumptions about trade and the electromagnetic pulse (EMP) effect.

These assumptions completed the base scenario. Impacts for key New Zealand systems (energy, communication, transport, health, food) could then be addressed. Impacts on human behavior and the economy were examined briefly, largely in relation to the key system responses. Given more time, impacts on other sectors such as education, social welfare, and the manufacturing industry could have been investigated.

#### Study Assumptions

The base scenario included seven assumptions:

1. A major nuclear war occurs in July in the near future.
2. Bombing is confined largely to the Northern Hemisphere and New Zealand is not a target.
3. Conditions in New Zealand are much as they are today with little effective planning or preparation undertaken in any pre-nuclear war crisis phase (weeks or months).
4. All trade between the Northern and Southern Hemisphere ceases for the foreseeable future.
5. Because of destruction of ozone in the upper atmosphere, caused by oxides of nitrogen from nuclear fireballs, ultraviolet (UV) levels increase by about 50% for a year and decline to normal over the next year.
- 6a. Three Australian-USA communication facilities at North-West Cape (Western Australia), Pine Gap (near Alice Springs) and Nurrungar (South Australia) are all destroyed by separate nuclear strikes. Re-establishment of trade with Australia is possible, but at reduced levels; or
- 6b. As well as the destruction of the three communication facilities, some military bases and cities are destroyed by direct targeting. These include the naval facilities at Cockburn Sound (Western Australia); Darwin's RAAF base, Canberra; and another major eastern city. In addition, a high altitude nuclear explosion 400 km above southeastern Australia covers New Zealand and two-thirds of Australia with an electromagnetic pulse (EMP). Because of the destruction in Australia and the widespread disruptions caused by the EMP, trade between the two countries collapses.
- 7a. New Zealand experiences no significant change in temperature (nuclear winter); or
- 7b. Temperatures drop by an average of

3°C throughout the New Zealand spring months (September—November); by an average of 2°C throughout summer; and by 1°C for the following 18 months. Thus, temperatures are below average for two years in total. (Corresponding to likely climate changes after a northern summer war).

#### Structural Analysis

An important early task in the study was to identify the key individuals, groups and sectors with an interest in the study and its outcomes, and relevant expertise. This meant establishing the political and professional context for the study and actively managing relationships with these groups during the project.

The NZ Planning Council is an independent monitoring and research agency and was thus an ideal base for the study team. As the study was government funded, various experts in government departments could also be asked to assist, including agriculture, fisheries, health, foreign affairs, defence, science, trade and industry, energy, transport, social welfare, telecommunications, treasury, and civil defence.

A Consultative Group was established including representatives of the NZ Environmental Council, the Commission for the Environment, the Health Department, the Meat and Wool Board's Economic Service and the NZ Royal Society. This group served as advisors for the early study design and established an appropriate profile for the project.

Relationships with the following groups were also seen as important: private industry; sector groups (farmers, health workers, fishermen, exporters, oil companies, etc.); the scientific community and relevant university departments (sociology, psychology, environmental sciences, political sciences, economics); professional societies; the peace movement/community groups; and the news media.

#### Questionnaire

Four systems were identified as critical to other impacts—health, energy, food production, and social responses. A major effort was devoted to identifying people and organizations who could comment on those areas. Other key systems were—communications, transportation, trade and employment, financial systems, urban systems, government agencies, refugees, South Pacific links, and environmental impacts.

The questionnaire was the major research tool in developing responses to the base scenario for the key systems.

Networks were used to contact about 300 people who were asked to read a paper titled *When Deterrence Fails* (which incorporated the base scenario into a story format), and to respond in writing to nine questions. The questions are listed in Box 1.

Follow-up phone calls to the questionnaire were made to respondents a month after the initial mail out. The response rate of 90% was excellent considering the short time period available (about 6 weeks).

The quality and detail of responses showed that people had reacted constructively to the questionnaire. It also justified this choice of method for investigating complex, wide ranging impacts that are not amenable to normal scientific analysis. It quickly exposed issues and information that more standard research might not have revealed. A shortcoming of this approach was that respondents lacked an understanding of likely impacts in other sectors that affected their own responses.

#### Interviews with Government Officials

Interviews were held with departmental heads or senior officials in Justice, Defence, Labor, Health, Social Welfare, Civil Defence, the War Damages Commission and the Prime Minister's Department. The response was very positive and the Study Team gained insights into the major organizational and structural problems that would face government departments. In turn, these interviews helped make key decision-makers more aware of the problems they would face after a nuclear disruption.

From these and other discussions a new impact emerged; the impacts on the machinery of government itself and on the role of government, in both the initial weeks of crisis and in the longer term (months and years) after nuclear war.

A special working group (including senior government people, an anthropologist, community worker and an economic historian) was established to ex-

#### BOX 1

##### Questionnaire

Imagine you are in the first week after the war as described in *When Deterrence Fails*.

1. What are the most likely immediate crises to deal with in your subject area?
2. What are your priorities?
3. What problems would you anticipate in—
  - a. the first six months
  - b. the longer term?
4. Can you imagine what alternative systems could be developed, starting from the post-war conditions?
5. How long would these take to be operating effectively and what would be likely to happen in the interim period?
6. What are the key industries or services on which your subject area depends? Are there any feasible alternatives?
7. Assuming sufficient preparation time before such a war, what would be feasible actions to take to minimize post-war disruptions?

Questions 8 and 9 asked for other relevant information and names of other people who should be approached.

amine these issues. The central question identified was not whether central government could continue to retain power and control, but whether it should and for what reasons.

One useful insight was that government structures and functions taken for granted in previous disasters (e.g. localized floods), could be inappropriate under other circumstances, such as the aftermath of nuclear war which would affect the entire country. Central government authority could itself be called into question.

### Public Opinion Survey

How people react to the impacts of nuclear war would be crucial to the total impacts experienced in New Zealand. As one of the central issues of the study, this was also the most difficult to investigate.

Likely initial reactions to the news of nuclear war were explored through several role-play workshops; these gave some insights, but were of limited use. In fact, the response of people to novel events would seem to be impossible to predict accurately, regardless of how much research is done.

What people *believe* would be the major threats to their well-being after nuclear war does, however, give some indication of their likely response. The Study Team therefore commissioned a nationwide public opinion survey to establish the depth of knowledge and beliefs held by New Zealanders as to the most serious consequences for New Zealand following nuclear war.

With a random sample of 1100 people (the total New Zealand population is around 3.3 million people), the poll results showed that almost half the population saw radioactive fallout as the most serious consequence. Nuclear winter and food shortages were expressed as the next two major concerns.

What the opinion survey showed was a poor match between public expectations of nuclear impacts and those identified by the study investigation. This underscores the value of the public education campaign proposed for Phase II.

### Role-Play Workshop

The base scenario was used as a starting point for several workshops involving New Zealanders from a variety of backgrounds, including police officers, community workers, "street kids", lawyers, artists, academics, shopkeepers, and manual workers.

Participants provided responses from their own point of view on what they would do on day one following the nuclear event, three months later and two years later.

The workshop participants were also asked to enact their responses in roles in two groups: a group of residents in an inner-city suburb and the Cabinet of the Government. This produced some indication of the tensions that could arise in urban communities. Of particular interest was the potential for conflict between the public and the politicians; with both groups acting from their respective perceptions of individuals and national best interests.

### Publications

The final study report was published as a popular book and received wide public coverage. In addition, a series of background papers were prepared outlining detailed technical findings of the study.

### CONCLUSION

What the New Zealand study showed was a social system with a high degree of dependency, interdependence and complexity. New Zealand is vitally reliant on trade, certainly by international standards; a factor increased by its geographic location and the scale of the economy. This leaves the country highly vulnerable to major international dislocation; be it from nuclear war, conventional war, or major economic collapse.

Reducing vulnerability in New Zealand and increasing resilience would extend the range of options available in a crisis. This could be achieved by a greater self-sufficiency in key commodities such as pharmaceuticals and energy fuels.

The obvious advantage of the approach taken in the New Zealand nuclear impacts study is that it has now provided a basis for analyzing the country's resilience and potential response to a range of national emergencies other than nuclear war.

The nuclear impacts study broke significant new ground in both assessing impacts of nuclear war and in methods for assessing the impact of complex events, at the national level.

Shortcomings in the study derive largely from the inadequate time frame. It was not possible to develop a detailed picture of the likely impacts between sectors and between environmental, economic and social variables. A particular shortcoming is the monocultural approach to the study. Maori people (the indigenous people of New Zealand) were consulted, but a more bi-cultural approach to the research would have undoubtedly produced different results.

The experience of the Phase I New Zealand nuclear impacts study suggests a number of guidelines for national case studies in other countries:

- The rationale for the study must be firmly established, including the sponsorship for the project and an appropriate reference group for advice and support.
- A firm scientific base must be provided for the study assumptions. Furthermore, conservative estimates for scenarios of the nuclear event are more illustrative and have greater value as policy inputs.
- The study should be undertaken by a clearly independent and reputable agency and one which has the stature to consult at the highest levels in government, the private sector and the community.
- The study team requires a range of professional skills including; project management, environmental science, sociology, community development, political science, public administration, economics, communication and public consultation.

- The purpose of the study must be clear; it should be conducted as a scientific investigation rather than an exercise in advocacy.
- The objectives, methods and approach for the investigation must be clearly established, preferably after consultation with people in a range of disciplines.
- The end-use for the study must be understood. If it is to be used as an input to policy, clear recommendations should come out of the investigation.
- The study team must have a well-developed communications strategy before, during and after the investigation.

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