Exploring Environmental Security: Nuclear Waste in the Indian Ocean Region

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Abstract

Interest in the concept of environmental security emerged forcefully in the Brundtland Report in 1987, and increased at the first Earth Summit in Rio de Janeiro in 1992. Ten years later, the nexus between environment, development and security was never stronger than at the recent 'Earth Summit Plus Ten' in Johannesburg in 2002. The notion of environmental security, however, is hotly contested. Its most common variation is concerned with the impact of environmental stress on societies, which may lead to situations of war within and between societies. Usually, environmental security issues cross nation-state boundaries, and provide an ideal vehicle for the discussion of regional frameworks. This paper critically examines the concept of environmental security within the Indian Ocean Region (IOR). It then introduces one urgent environmental security issue – the production, treatment, transport and storage of nuclear waste – within the context of the IOR.

Whilst many parts of the more affluent world are moving away from nuclear power as an industrial and domestic energy source, the Indian Ocean Region (IOR) is rapidly increasing its nuclear energy profile. Most often, this increase in nuclear profile is evidenced in discourses linked to the nuclear proliferation of weaponry. Because of the IOR's informal status as 'Ocean of the South', the environmental security focus on nuclear power has not been sufficiently explored, as the possibilities of nuclear accidents - whether in mining, power generation, reprocessing, transport or storage - are seen as risks that those 'less affluent' are expected to take. With the IOR's increased nuclear profile, it is critical that environmental security concerns are included alongside the

more traditional security concerns of weapons proliferation and possible nuclear war.

Introduction: What is Environmental Security?

> The environment has often been used as a tool of war, from the salting of Carthage to the Russians' scorched earth retreats before the armies of Napoleon and Hitler. Plato, mocking the notion of a republic of leisure, argued that such a regime would soon resort to a war to satisfy its taste for more space and natural resources. But sustained thinking about the environment-conflict connection is a product only of the last few decades. While clashes over non-renewable resources such as oil or gold are as familiar as the Persian Gulf war, the question now is about the role of renewable resources such as water, fish, forests, and arable land (Dabelko 1999: 2).

Although there have been conflicts over resources since the earliest human societies, interest in both renewable and non-renewable resources within environmental security frameworks has dramatically increased since the end of the Cold War. Security is usually understood in state-centric terms, 'concerned with intentional physical (mainly military) threats to the integrity and independence of the nation-state' (Scrivner 2002: 184). Immediately after the so-called 'victory of capitalism' and the break-up of the communist-inspired USSR in the late 1980s, world orders, which had existed since World War II, were called into question. During this time of uncertainly, there re-emerged a global, almost post-modern, policy-shaping concept embracing a shared plurality of interests which crossed nation-state borders, commonly referred to as *multilateralism*. The multilateralist decade of the 1990s, which

ended as the current phase of US unilateralism emerged forcefully in the new millennium, was an era when new boundaries and borders were drawn in the sand, as alternative concepts of identity and collectivity were imagined. One such idea, which evolved at this time, was that of *environmental security*[i].

This trend was reinforced and supported by military establishments, which sought means by which they could continue to justify Cold War levels of military expenditure during an apparent time of peace and prosperity for the West. As a result, both the US and Russia formed high level units of environmental security within established security institutional infrastructure, such as the Pentagon's Centre for Environmental Security[ii]. Paradoxically, some peace advocates also championed the concept. In a book appropriately entitled *Green Security or Militarized Environment,* Jyrki Kakonen writes:

> Peace researchers have argued for environmental security in order to show that…national defence resources could be used for civilian purposes in the field of environmental problems. The aim is to convert military resources…to do the environmental protection in order to transform the military into a paramilitary and further into a non-military organization. This is an option after the Cold War, but there is a danger that the militarist approach to deal with environmental issues leads to the militarisation of the society…(Kakonen 1994: 4).

This interest in Gaia as the common enemy (as well as a pathway to common salvation) was further heightened in the West due to increasing, but rather late, understandings that the minority world (the more affluent world) had to share its basic survival systems with the majority world (the less affluent world). This concept of a shared spaceship Earth had been vociferously

pushed by the western environmentalists since the late 1960s, but due to the characteristic conservatism of traditional security studies this green rhetoric was only picked up in the academic literature and the governmental grey documentation in the late 1980s and early 1990s.

This interest in environmental security emerged forcefully in the Brundtland Report in 1987, and increased at the first Earth Summit in Rio de Janeiro in 1992. The nexus between environment, development and security was never stronger than at the more recent 'Earth Summit Plus Ten' in Johannesburg in 2002. The notion of environmental security, however, is hotly contested. Its most common variation is concerned with the impact of environmental stress on societies, which may lead to situations of war within and between societies. In this manner, environmental security agendas are about seeking issues which, if not addressed, may provide the basis for increasing human conflicts. In this sense, environmental security is understood in somewhat negative terms.

The advantage of this redeclared enemy - nature itself - was, or so it was believed in the Westphalia mindset, that it constituted a 'common' security issue for all humankind, or in the words of Brundtland 'Our Common Future'. Despite the aforementioned interest in the concept of green security by peace researchers, it is an aggressive and militarised version, which has been financed and supported by more affluent nations. As with the now dominant, ambiguous and insidious concept and symbol of *terrorism*, the symbol, *environment* and such spin-off concepts as *sustainability* are powerful multilateral and equally malleable concepts, which cross nation-state borders relatively easily. In this manner a new enemy is imagined, *nature* is constructed as a terrorist, able to attack the nation-state at any time, bypassing the traditional rules of warfare and its conventions, striking at the very heart of the marketplace: 'we are at war with the earth'.

This interest in a *combative environment* is not new. In western terms it has been aptly recorded in the 18thC works of Thomas Hobbes. In his most famous work – *Leviathan* – Hobbes depicts nature as in a state of perpetual war with itself: '…and the blood-dimmed stains shall be loosed upon the world and all anarchy will prevail…' (Hobbes 1772). This conservative view of nature was used by Hobbes to justify his call to create an all-powerful authoritarian 'machine' which would be the only means to avert global environmental catastrophe. Of course, in this understanding of nature, humanity is also in a perpetual 'state of ware' (Hobbes). This western understanding of the 'state of nature' is not just restricted to neo-Obeisant, but has substantial populist credence, as most western imaginings comprehend peace to be the aberration whilst war is construed as the 'natural state'. In many ways, within this dangerous mindset, nature can be constructed as the ultimate enemy. Like terrorism, it can be despised and feared by all. Clear boundaries marking out who is friend and who is foe are no longer possible to draw in the sand. Like an imagined alien attack, it unites all in a flag-rallying fervour. The Westphalia argument continues: only Hobbes' authoritarian machine will save us. A concept which, at first glance, offers the promise of multilateral initiatives, is now leading to unilateral and bilateral solutions, imposed by the minority world over the majority world, through enforced market entrance leading to cultural and ecological dispossession and devastation, ultimately backed up by the military force of the West.

Of course, the symbols environment and sustainability are not common at all; rather the issues, which gather under its umbrella, are culturally diverse. Concepts of environment are far from apolitical; rather, they are the exact opposite (Doyle 2002). They are intensely politicised categories utilised to redraw boundaries of collective identity, behaviour, political activity, security and, most importantly, power and resource distribution. Elsewhere I write:

> So environmental politics is not just about 'goodies' versus 'baddies'. This symbol environment has such power that numerous cultures, and the powerful and powerless within them, invoke its name for disparate purposes (Doyle and McEachern 1998: 4).

That the 'environment' flag means many different things to different people, does not make it a charlatan. Rather, it is a symbol almost as broad as nature itself. It is perfectly chosen for the infinity of possible responses, which gather under and around it. Just when it appears that a safe net of definition can be cast over it, it wriggles out, and takes on a new guise, in a separate context (Doyle 2002, Chaturvedi 1998). Therefore, the list of issues, which make up an environmental security agenda is an important list; but an extremely subjective and culturally determined one. Those who construct such an agenda must be cognisant of these different meanings and issues, and respectful of these differences and variations if practical solutions are to be uncovered which make sense to the people who are most affected by these forms of environmental degradation.

Environmental Security and The Indian Ocean Region

Obviously, establishing an environmental security agenda for the Indian Ocean Region (IOR) is significant in that it addresses basic survival issues which affect most of the inhabitants of the region, approximately one third of the globe's population. Chaturvedi writes:

> The Indian Ocean has been rightly described as the 'Heart of the Third World' or the 'Ocean of the South', with low per capita income and low levels of development in the majority of countries. The overwhelming mass of these peoples struggle to survive under the conditions characterised by chronic poverty, precarious political systems, stagnating and struggling economies, fragmented political systems guided by the considerations of ethnic identities....(Chaturvedi 1998: 712).

At the end of the 1980s, when these agendas for common futures were first being drawn up, predominantly *western* issues were being recast as *global* ones. The minority world, in this light, portrayed the major problems of the globe as species extinction, global climate change, desertification, and overpopulation[iii]. Needless to say, at the end of the 1980s, these were not issues high on the environmental agenda as defined by most people living in the majority world, many of whom dwelt in the Indian Ocean Region. Other issues of more immediate survival dominated (and still do) such as health, shelter, food and water security. In a provocative book entitled *Tears of the Crocodile*, Moyo et. al. argues that the developed world has managed to divest itself of its responsibility to the global environment by moving the arena 'away from people and onto things, forces'. They write:

> In short the developing world for the first time, is being asked to be an equal partner in a world-wide endeavour precisely because the emphasis has shifted away from the needs of the poor. By advancing an environmental agenda the North has once more concentrated on its own interests and has called them globalism (Moyo et al 1993: 5).

Within this western framework, when people were seen as part of an 'environmental security' agenda, ambiguously people are not perceived as part of the environment; they are simply users or, in the case of the poor, degraders (Doyle 1998). In 1990, the United Nations Human Development Report argued that poverty is one of the greatest threats to the environment and in 1993, the International Monetary Fund (IMF) announced: 'Poverty and the environment are linked in that the poor are more likely to resort to activities that can degrade the environment' (International Monetary Fund cited in R. Broad 1994). There are two key problems with this line of argument. First, all poor people are regarded in an homogenous fashion. An important distinction must be made on the connections between *types* of poverty and environmental degradation. For example, those still operating subsistence lifestyles (though under threat); those who have been recently removed from this lifestyle; and those people who have long ago been driven to the precipice of survival (the 'landless and rootless') have very different relationships with their environments. The latter have no security of tenure and little connectedness to place. This category includes those peasants and squatters who survive by cutting forest cover, by consuming wildlife, and by planting crops on soils, which will erode (Doyle 1998).

Secondly, many western environmental security theorists fail to weigh up the costs of advanced industrialism on a global scale; not just within the boundaries of nation-states. Issues of over consumption in the minority world - and by the minority world - cannot be underestimated. The fact is that the

U.S. and Japan together represent 40 per cent of the world's Gross National Product cannot be denied (Imura 1994). In the Indian Ocean region, the consumption patterns of Australians far outweigh most of, for example, their Indian and South-East African neighbours. Obviously, the creation of an agenda for this kind of common environmental security was greeted with

> In less developed countries of the world, these ideas have elicited mixed emotions. Obtaining food and water is a daily struggle for the world's 800 million malnourished people, and according their problems the high priority of a security issue obviously has great appeal. But leaders in.....Cairo, and Kuala Lumpur also fear that such an approach will invite violations of their national sovereignty as outside powers intervene to "help". They gave a frosty reception, for example, to Gorbechev's 1988 proposal to complement the blue-helmeted armed forces serving under the United Nations with a "Green Helmet" force to react to natural catastrophes and environmental crises (Dabelko 1999: 14 - 18).

some scepticism in parts of the majority world. Dabelko writes:

A concept of environmental security which is more inclusive of the interests of the majority of people in the Indian Ocean states, both littoral and non-littoral, is one that moves away 'from viewing environmental stress as an additional threat within the (traditional) conflictual, statist framework, to placing environmental change at the centre of cooperative models of global security' (Dabelko and Dabelko 1995: 4). But to do this, there must be increased understanding of the environment, not as an external enemy force; but as a diverse nature which is inclusive of people; a nature which has the potential to provide secure access to individual citizens of all countries in the Indian Ocean region to basic nutrition; adequate access to healthy

environments; appropriate shelter; and, a security to practice a diverse range of livelihoods which are both culturally and ecologically determined.

There is an enormous gap in the literature on environmental security and the Indian Ocean region. There have been substantial academic works completed in recent years on the broad subject of environmental security (see, for example, Myers 1993; Dabelko and Dabelko 1995; Broda-Bahm 1999; Lowi and Shaw 2000; Redclift 2000; Cheremisinoff 2002). Some of these works move from theory into empirical research, but when this occurs, most of this scholarship is based in and around the Atlantic, Pacific and Southern Oceans (see Kakonen 1994; Barnet and Dovers 2001; Dokken 2001; Foster 2001). It has been very rare that researchers have utilised the concept of environmental security in the Indian Ocean region.

This lack of research literature reflects neglect by Australia to look westwards to its Indian Ocean neighbours; but also, at the broader level, by the more affluent, minority world in addressing social science policy issues confronting the South. There have been some articles addressing a particular environmental security issue in a specific country, such as water wars in the Jordan Basin (see Shaheen 2000) or environmental degradation leading to human displacement in South Africa (Singh 1996). In a search of the electronic version of *Expanded Academic Index*, only one reference emerges which includes environmental security insights into the Indian Ocean region as a whole (Chaturvedi 1998).

The concept of environmental security must be brought to life by reference to some of the most pressing environmental issues confronting the Indian Ocean region. Whilst many parts of the minority world are currently seeking technological solutions to environmental problems, for many researchers in the Indian Ocean region the major task is still documenting the list of environmental problems, attempting to collate base-line data which is sadly

missing. In another expanded article (Doyle 2004b), I outline the work of the Indian Ocean Research Group (IORG) of which I am Foundation Convenor for Environmental Security. At its inaugural conference in India's troubled Punjab last November, broad social and ecological problem areas were identified, each one ecologically interlocking with the other, snowballing in magnitude, creating desperate realities for billions of people culminating in abject poverty, both in terms of biodiversity (or lack thereof) and in terms of human existence: land degradation; water; fisheries; climate change; nuclear waste; environmental refugees; and urban explosion and deterioration.

In this paper I introduce another issue to add to the original environmental security agenda of the IORG: the increasing nuclearisation of the region, with an emphasis on waste creation, storage and transport.

Nuclear Issues as Environmental Security

Like climate change and population growth, nuclear issues cross nation-state boundaries with ease. The globe is at an interesting point in its relation to nuclear power. Despite the recent re-championing of nuclear power by the George W. Bush administration in the United States, many industrialised countries are reducing their reliance on nuclear energy, recognising its inherent, long-term environmental dangers. Wealthy countries such as the heavily industrialised Germany, are now decommissioning their nuclear industry over the next thirty years.

Just as many parts of the industrialised world have come to the realisation that the nuclear option cannot be sustained in an environmentally secure fashion, parts of the majority world have now embraced the technology. The Indian Ocean Region (IOR) is now undergoing rapid nuclearisation, with many countries inhabiting the IOR now embracing the technology for the first time. Issues of nuclear waste, its safe transport, and its final disposal have not been high on their environmental or nuclear agendas.

Issues pertaining to nuclear power have so far largely escaped being included in debates about environmental security. One of the key reasons behind this is that nuclear issues are already considered as part of the mainstream, traditional, 'hard' security or defence debates. This focus on nuclear energy is almost always considered from the angle of weaponry and arms proliferation, and is almost always centred on the identities of nation-states. So, it is not so much introducing nuclear issues into the security rhetoric out of the policy cold; but rather, dragging some of its related issues out of "traditional"

security debates, and then including them in the more alternative, human and environmental security discourses.

For the purpose of this paper, I have not purposively entered into the debate over nuclear weapons build-up in the region (which of course is already high on the international security policy agenda); but, instead, I have sought to recast the nuclear question in the Indian Ocean Region as an environmental security issue: principally dealing with the ever-increasing problem of nuclear waste, its production, transport and its storage.

Before this paper can concentrate on its core task - the ever-increasing problems of the storage of nuclear waste and its transport in the IOR - it must be fully understood that opposition to nuclear power in the Indian Ocean - to this point in time - has been minimal, except in the case of Australia. The reasons for this are many. First of all, the majority of the Indian Ocean is usually classified as *third world*, and nuclearisation has normally been a characteristic of industrialisation. But most importantly, the dangers of nuclear accidents - whether they occur during plutonium production or during the handling and storage of waste products - are often regarded by majority world governments as constituting acceptable levels of environmental risk. In the current case of Iran, with fears of a U.S.-led invasion dominant in domestic policy circles, the possibilities of a nuclear accident are not rated highly on either security or environmental agendas. Concerns over such environment risks are often regarded as *luxury* concerns.

At the other end of the Indian Ocean, Australia, on the contrary, has been home to the vanguard of anti-nuclear movements in the global theatre, alongside with the aforementioned Germany. Some of the questions on environmental security which have emerged from the Australian experience have informed the more affluent, minority world. These arguments are a

harbinger of what is to come in the Indian Ocean region as a whole, as it becomes *the nuclear ocean*.

Current Nuclear Issues in the Indian Ocean: The Case of Australia

Nuclear reactors and nuclear waste dumps are either being constructed, or are under consideration for the first time in many parts of the IOR. Australia is currently in the early stages of building a new nuclear reactor to replace its old research reactor at Lucas Heights in Sydney. Other IOR nations, including India, Pakistan, Iran and South Africa, have all either recently developed a nuclear program, or are in the initial stages of development. Linked to these reactors is the need to consider more permanent repositories for nuclear waste, as well as issues that relate to the transport of such waste. At this time of writing, there are at least five major anti-nuclear campaigns unfolding concurrently in Australia:

1. Jabiluka The most world renowned Australian anti-nuclear campaign is the Jabiluka campaign fought at Kakadu in the Northern Territory. It arguments are three-pronged, inter-changing between the rights of indigenous peoples (which is the most dominant voice), the values of Kakadu wilderness in its national park, and its anti-nuclear stance against uranium mining.

2. Roxby Downs The campaign against Western Mining Corporation's (WMCs) Roxby Downs is aimed at curtailing the expansion of one of the biggest uranium mines in the world. Mostly this campaign is run out of South Australia. Environmentalists opposing the mine primarily utilise anti-mining and anti-nuclear arguments; though there are some subservient indigenous arguments, and a very small number oriented around wilderness values. The aforementioned campaigns focusing on the Roxby Downs in South Australia are largely confined to that state. Most eco-action takes place in the capital

city, Adelaide, with some direct actions occurring at the mine sites themselves and within local aboriginal communities.

3. Insitu-Leach Mines Also in South Australia are campaigns levelled at halting the development of two 'in-situ leach' mines which are currently under production. The mines are owned by two transnational corporations: General Atomics (primarily a U.S. corporation) and Southern Cross (a Canadian-based company). Most of the movement's arguments in these cases are levelled at inappropriate 'third world' technology being utilised by these companies, which pump a uranium-depleted, acid-based waste solution back into the aquifer when the mining process has been completed. This process is illegal in the corporations' 'home' countries.

4. Lucas Heights Reactor In New South Wales, another Australian state, there is a key anti-nuclear campaign which focuses on shutting down the existing Lucas Heights Reactor in Sydney, and preventing the building of a new reactor facility to replace it. Also in Sydney is a campaign which focuses on matters of nuclear war. Most particularly, strategic arguments have emerged which contest the United State's proposed missile defence strategy championed by the U.S. President George W. Bush. Linked closely to the new reactor is the development of a national waste repository.

5. International and National Waste Dumps In Western Australia and South Australia large campaigns based on mass mobilisation techniques are aimed at stopping Australia, and those specific states within Australia, from becoming an international and/or national nuclear waste dump.

Most of these campaigns in the Australian context are either aimed at halting the nuclear fuel cycle at its base: that is, to challenge the validity of mining uranium ore itself; and/or to object to the construction of a storage facility for the waste products of these processes. In this manner, opposition against

nuclear programs is firmly placed within the discourse of environmental security as laid out earlier in this paper.

Transport and Storage as an Environmental Security Issue

In Australia - the nation with the most developed opposition to nuclear energy in the IOR – the future campaign phase will inevitably be levelled at the proposed transport of nuclear waste, once (and if) plans for a centralised waste facility becomes a reality. At the moment, this is also a political party issue, and the fate of the 2004 general election may decide the issue's final outcome. Already, however, anti-nuclear activists, both within mainstream parties and within broader social movements, are building a new case for opposition based purely on environmental security issues which will inevitably emerge from the transport of such wastes. The transport of nuclear waste crosses both state, national and international boundaries: it comprises and environmental security issue in the purest sense. Within the IOR, there are two key areas of concern. The first relates to radioactive waste being transported by sea from international reprocessing units in Europe. The second area relates to the transport of waste by land. This may include waste which emerges from the mining process (reviewed using the case of India, in the next section), as well as the more toxic substances which evolve after the processes of nuclear reaction. As far as the latter scenario is concerned, this has not yet occurred in sufficient quantities in the IOR.

Transport and Storage of Nuclear Waste Within the Indian Ocean

As discussed at length, traditionally, the key problem for the globe in relation to waste has been waste disposal *after* atomic reaction occurred. But because most countries in the IOR region have infant nuclear programs, this problem has not yet reached its future magnitude. But what is already pressing in these less affluent countries, are issues of primary waste management which

relate directly to the mining process itself. In wealthier countries such as Australia, the management of these wastes through the utilisation of tailings dams is usually based on adequate levels of technology, although there are still dangerous leakages reported at disturbingly regular intervals. In the poorer parts of the region, these basic storage issues pertaining to tailings dams are further exacerbated by the increased levels of environmental risk which are considered by both state and corporate players as acceptable.

Let us consider the case of India. India has embarked on the three-stage nuclear energy program which its government believes will reach its full fruition by 2020, with 20,0000 mw of electricity produced. One of the key problems for India relates to its very low grade uranium stocks, thus necessitating mining on an extremely large scale, with few economic margins available to pursue adequate environmental and safety measures. As a consequence, 'normal' safety standards pursued in the minority world are almost non-existent in South Asia. In the main uranium mine – Jaduguda – 200 trucks of ore pass through the village everyday. Uranium tailings lie unprotected in front of the local school. The liquid waste from the mine is dumped in the tailings dams, which is then diverted into a channel, ending up in the Subernarekha River. In one of the villages, Chatikocha, 500 people live below the embankment of the tailings dam (Mahapatra 2004). Saluka Himbram, the head of the village, talks of living next to the mine and the tailings dam:

> Abnormal births have become common. Half of the women have problems in delivery and miscarriages… We feel like vomiting when the wind, carrying fine dust from the pond, reaches us… The tailing pond must be causing the problem (quoted in Mahapatra 2004)

The critical message here is that environmental security issues relating to uranium mining and nuclear energy will be magnified in the less affluent

world. The case of Australia may allow us to imagine a nuclear future for the Indian Ocean – to wrestle with potential waste issues – but the cold reality is, that the Indian Ocean, as a nuclear ocean, will exhibit levels of environmental degradation which can be scarcely understood in west imaginations. In simple terms, the lives of people are more expendable, in political terms, in the majority world, and this, in turn, has a devastating impact on their environments.

At the regional level, it is not just waste that is generated within the region; but also the ever-increasing waste which passes *through* the region. The Indian Ocean is often referred to as the Ocean of the South (Chaturvedi 1998). As such, environmental practices are often excused on the basic reasoning that the lives of many people in the region are so environmentally-marginal, that 'a little bit more degradation will not hurt'. As a consequence, the Indian Ocean region is currently being used as a key transport route for nuclear waste. The two biggest destinations for the processing of waste are Sellarfield, in England and Le Hague in France. Song writes:

> The first question in nuclear waste disposal is reprocessing, which can recover a significant quantity of useable material for nuclear reactors and reduce the amount of high-level waste that must be stored to about three per cent of the original spent fuel (Song 2003: 8).

Waste reprocessing breaks down spent fuel, chemically dissolving it, with the plutonium separated from it. Apart from large, routine discharges of radioactivity from this high level and long-lived nuclear waste, this plutonium is now mixed with uranium (MOX) and re-used in conventional reactors. The Japanese are the biggest proponents of this process, and receive their shipments from both the British and French reprocessing plants.

Unfortunately, this MOX fuel is often transported through the Indian Ocean on its way back to Japan.

It is impossible to know just how many of these shipments are being made, due to the high-levels of secrecy which surround them. What we do know, is that on 21 July 1999, two ships carrying weapon-usable plutonium, left Europe via the Cape of God Hope, through the Indian Ocean to Japan. The task of publicising the shipments was left to transnational NGO – Greenpeace, who reported as follows:

> The two British flagged vessels, the Pacific Teal and the Pacific Pintail, left Barrow in Britain and Cherbourg in France carrying the first commercial shipment to Japan of mixed-oxide (MOX) reactor fuel, made from plutonium and uranium. An estimated 446 kilograms of plutonium is contained in the 40 nuclear fuel elements – enough fissile material to construct at least 60 nuclear bombs …The Cape of Good Hope has become the path of least resistance (Greenpeace 1999).

Only Mauritius, acting alone, made public its opposition to the reprocessed fuel's transport, by refusing to admit the vessels into their Exclusive Economic Zone (African News Agency 7/3/99). Of course, this can only be a symbolic position, as the devastation which would occur if the vessel was sunk, or caught fire, would make the 200 km zone, as a zone of protection, look ludicrous. The point has already been made that under existing liability agreements, there is some limited compensation under international conventions; 'but no assurances exist whatsoever that the full costs of health, environmental and economic damages would be paid to victims in enroute states.' (Greenpeace 1999).

Conclusions

Apart from dismissively being regarded as simply enroute states for the international trade in waste reprocessing, countries of the IOR are also increasingly being looked at as possible repositories for international waste, as a nuclear dumping ground. If the only waste product of nuclear energy was high-levels of radioactivity with a half shelf life of 250,000 years (as is widely reported for high-level waste) then the Indian Ocean would already have been targeted. For as is already well-documented by the environmental justice movement, it is the poorer nations who accept the waste of wealthier societies, in exchange for money. And within those countries, it is the poorest communities who are forced to dwell alongside these repositories (Bullard 1993).

At this juncture, the environmental security concerns of waste storage and transport become intermeshed, once more, with more traditional, security concerns of nation-states and their defence. Because spent nuclear fuel can be reprocessed to produce both weapons of mass destruction – as well as energy - the placement of such waste dumps is highly politicised; with the United States increasingly involved in decisions as to who can and who cannot store and reprocess spent nuclear fuel. In fact, recently the US has decided to store all its own spent fuel at Yucca Mountain by 2010 in Nevada, in large part, due to its fears that exported waste may find its way into the nuclear defence programs of other nations.

Of the Indian Ocean countries, as mentioned, Australia has been specifically targeted as a possible dump by transnational corporation Pangea. In the late 1990s, Pangea placed the policy spotlight on Australia due to its apparent political and geomorphological stability. Though there is some merit to the geomorphological arguments, imagining that political stability could survive thousands of years is rather comical and nonsensical, at best and, at worst, downright dangerous. Currently, Pangea has backed off its Australian target, whilst the Australian Federal Government has taken over the running - this

time advocating a low to medium density national waste repository in South Australia. As touched upon, both the state government of South Australia, the national opposition, and many interest groups in South Australia remain vehemently opposed against such disposal on their doorstep.

In other countries in the IOR, both India and Pakistan store their own waste. In the case of Iran, there appears to be some tensions as to whether the waste from the newly constructed Bushehr nuclear power plant will be transported to Russia, or will remain on home soil (Kerr 2002: 29). Sections of the Iranian government want to store their own waste, whilst powerful elements in the international community – particularly the U.S. - have made it clear that if the waste is not returned to Russia, then the nuclear program within Iran should be terminated.

At the broader level of anti-nuclear movements across the globe, it is extremely interesting to see anti-nuclear movements emerging for the first time in the majority world. As aforesaid, these movements also share an active disdain for the build-up and utilisation of nuclear weapons within traditional security discourses.

The Indian Ocean is fast-becoming the nuclear ocean. Because of its status as ocean of the south, the environmental security focus on nuclear power has not been sufficiently explored, as the possibilities of nuclear accidents whether in the mining of uranium, power generation, reprocessing, transport or storage are seen as risks which those less affluent are expected to take. With its increased nuclear profile, it is critical that environmental security concerns are included alongside the more traditional concerns of weapons proliferation and possible nuclear war.

Environmental security issues such as nuclear energy, provide human security issues which cross the political boundaries of nation-states, gathering

momentum in ecological, geopolitical regions such as the Indian Ocean region. It is the immensity of these problems, paradoxically, which demand regional co-operation if they are to be successfully addressed. This co-operation, with great hope and conviction, may one day provide environmental security – human security - for all who dwell in the region.

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[i] I first wrote about the issue of environmental security in the context of the Indian Ocean in a paper dedicated to establishing an agenda for broad environmental security issues for the Indian Ocean Research Group (see Doyle 2004b). I wrote this in my capacity as Convener for Human and Environmental Security for the IORG. The IORG is a non-profit social science research group dedicated to discussing regional issues specific to the Indian Ocean Region.
[ii] Interestingly, since the events of September 11 2001, environmental security in the US context is often considered as one and the same as 'homeland security'. (Cheremisinoff 2002).
[iii]For an excellent example of this line of reasoning read Hartshorn, G.S., 'Key Environmental Issues for Developing Countries', *Journal of International Affairs*, vol. 7, 1991, pp. 393-401.