

Abstract

Presently we have a record of the highest temperatures ever recorded and the trend is for even higher temperatures. At what rate this trend will continue is chiefly determined by what and how humans choose to consume resources. (IPCC 2001a)

A change in behavior is called for, but in order for success we must gain a common understanding that all will benefit if individual action is restrained. This requires large numbers of dispersed, dissociated individuals to take coordinated actions. This approach requires a free and open exchange of ideas in an atmosphere of respect. (Habermas 1979)

Since as individuals, we know little of our world from personal experience: most of what we “know” – even if we think we “know it objectively” – is based on what epistemologists call testimonial knowledge (Greco and Sosa 1999). The mass media is a large conveyor of testimonial knowledge, as such the media has a huge responsibility. In essence it represents our window to the outside world. Thus the media becomes one of the most important areas of science communication. (Van Ginneken 1998, Scanlon et al 1999) Newspapers due to their format are especially well equipped to serve this role.

However some scholars argue that there is a “gap” between what is required and what is available. (Tickell 2002)

A survey intended to examine if the mass media is taking its responsibility of communicating climate change in an adequate fashion, or if there still is a “gap” was set up. The survey compared two newspapers (New York Times and The Times, London) over two akin dates from 1992 and 2002 in order to establish if the thesis statement “newspapers are today not an appropriate media for climate change information distribution” can be considered correct.

The conclusion is that the thesis statement is accurate.

Preface

I guess this is where I write whatever I want... First of all I have to bow my head to the program (Lund University Master of Environmental Science) I have dedicated 18 months towards completing. I must admit I was skeptical at first if I had made the right decision. But in retrospective it has been the most rewarding higher education I have taken part in.

I have chosen a topic well beyond the scope of my Bsc (Conservation Biology and Environmental Management). This has proven rewarding and challenging, emphasis on the later. I hope I have prevailed. I have had a lot of help and support from the people around me.

There are countless people to thank and I will inevitably forget some however, here is a list of the most important;

My family for without whose support this would not have happened

The LUMES teaching staff for broadening my awareness

My supervisor Peter Dahlgren for showing my the way

The staff, especially Karin Lundqvist, at Kungliga Biblioiteket, Stockholm

The staff at Linköpings Universitets Bibliotek, Linköping

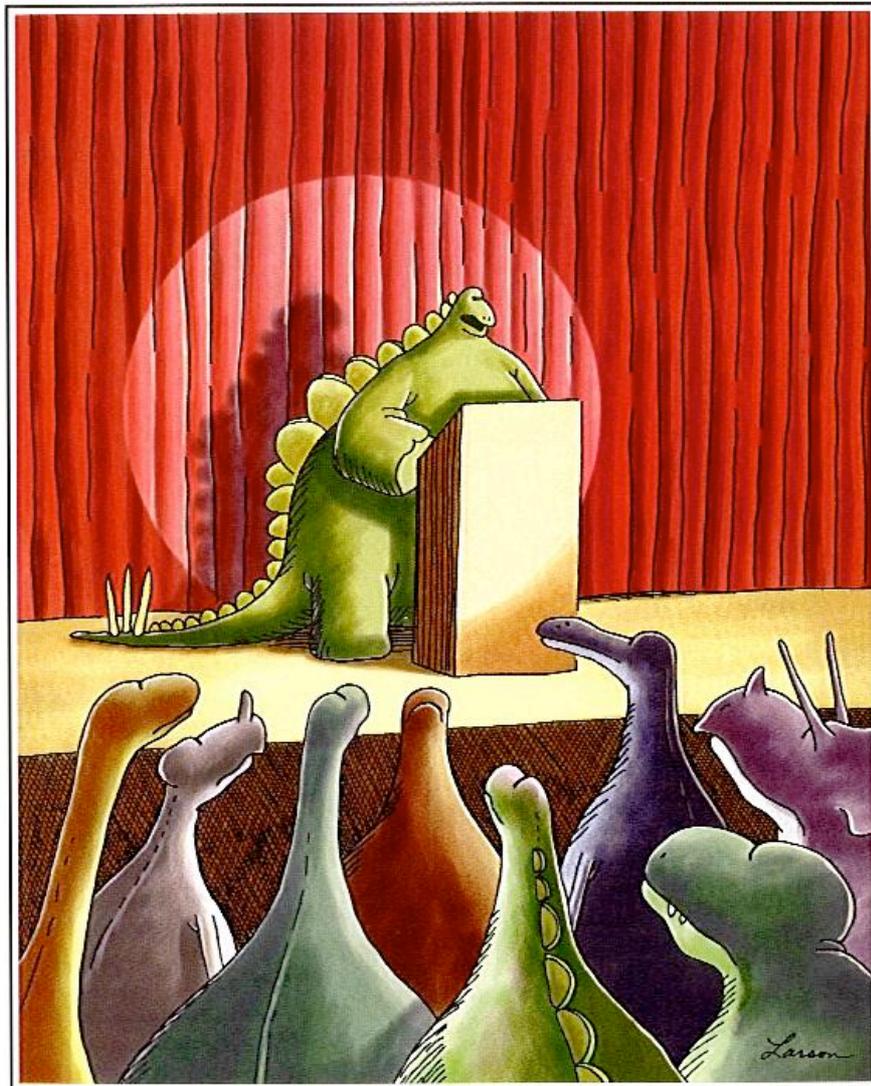
The staff at Kongliga Biblitektek, Copenhagen

The staff at various other libraries

The Söderlind family and Loisse Andemar for your limitless hospitality

Enjoy

Climate change and the media: are newspapers suitable for conveying the risk



“The picture’s pretty bleak, gentlemen. ... The world’s climates are changing, the mammals are taking over, and we all have a brain about the size of a walnut.”

Source Larson 1999 p87

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Part I Introduction

Introduction

It is arguable if it was climate change, a giant meteor or puny brains that drove the dinosaurs to extinction – or maybe all three. Regardless of what the scientists finally conclude it all boils down to one credo; the dinosaurs disappeared from the face of the earth because they could not adjust to new realities. This lesson applies today to us. The Climate is getting warming each and every day, the question being not so much *if* but rather *how fast* and when we shall start adapting on a major scale. (IPCC 2001a)

Adaptation will demand some major social, technological and economical changes. These changes will be easier the sooner we start dealing with them.

As the focus of environmental action shifts to sustainable production and consumption, information becomes more important in raising awareness and contributing to behavior change. Information provision becomes a key tool as environmental policies make the shift from directing the actions of the few (via regulations) to encouraging the behavior of the many (via incentives and information provision). (European Environmental Agency 1999 (EEA))

Over the last decade there has been increasing interest in “demand-side” environmental measures, such as encouraging public transport and energy efficient improvements. However to successfully achieve this shift requires the cooperation of more stakeholders than the traditional “supply side” measures of building roads or power plants needed. The many more stakeholders further increase the need for widely shared public understanding of the reasons for particular policies. Accordingly;

“Appropriate education and public awareness should be organized as one of the pillars of sustainability, together with legislation, economy and technology” (Declaration of Thessalonika, UNESCO,1998)

The mass media represents our window to the world (Van Giniken 1998, Scanon et al 1999, Greco and Sosa 1999). It represents an important source of this information; as such it has an important role in a free rational-critique communication of science to policy makers and the public. (Habermas 1989)

However, there is a gap between expectations of the public and what is delivered. The inherent uncertainty and complexity of science becomes difficult for policy makers and journalists to communicate. (Tickell 2002). The questions of “how successful the media is in communicating science to the public” and “Is it even capable?” are raised. The focus of this thesis is on examining if the mass media can communicate science to the public in order to achieve sustainable development with regard to climate change.

A minor case study was conducted in order to try to assess the performance of two internationally respected newspapers. Given the literature review it is assumed they will under perform in mediating the risks of global warming to the public. (Tickell 2002, Stone and Boudreau 1995, Stepp 1991)As such the thesis statement is “newspapers are today not an appropriate media for climate change information distribution”

Part II Theoretical Framework

Sustainable Development

The aim here is not to go into an in-depth discussion of the concept of sustainable development (others have done this already, see Elliott 1998 or Connelly and Smith 1999); instead the aim is to give an outline of what it means, and to illustrate that it is a contested idea.

The terms "sustainable" and "sustainability" took on a new meaning in the 1980s as the news media made people increasingly aware of the growing global problems of overpopulation, drought, famine, and environmental degradation that had previously been the topics of numerous academic papers among the more well-known include; "Population: the first essay" by Malthus (1798; 1959), "Silent spring" by Carson (1962), "The tragedy of the commons" by Hardin (1968) and "Limits to Growth" by Meadows et al (1972). By 1983 the relationship between economic development and its impact on the environment had become the focus of the UN World Commission on Environment and Development, (the Brundtland Commission). This organization was the first to introduce and popularize the definition of sustainability and called for strategies that integrated environmental, social and economical aspects of development. The idea of finding a common ground for economic, social and ecological goals, or the three pillars/spheres of sustainable development is illustrated below (figure 1)

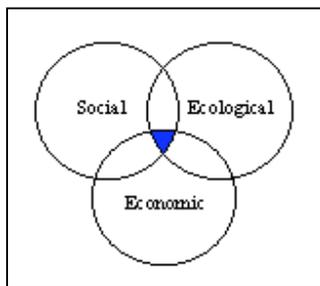


Figure 2 The "3 spheres" of sustainable development with the common ground in dark

But it was not until the Brundtland Commission published its report "the Brundtland Report" (WCED 1987) that any wider recognition was received (Elliott, 1998). It was in this report that sustainable development was defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (WCED, 1987 p 43). This has, arguably, become the most quoted phrase in environmental politics. However, there is little agreement on precisely how an ambiguous idea of sustainable development should be accomplished. Indeed sustainable development is "one of the most contested ideas in global environmental discourse" (Elliott, 1998 p 179). Since the main concepts are open to interpretation, it allows anybody to use the term much to their liking without it being misused as such.

The concept must be broken down, in ideological terms it can essentially be divided into the "weak" and the "strong" definition.

The weak (Brundtland) definition is the favored definition of government and industry alike as it requires no major change to the dominant worldview, i.e. that increasing economic growth is compatible with protecting the environment. This is often referred to as "ecological modernisation". (Connelly and Smith, 1999, Elliott, 1998)

The strong definition on the other hand takes the view that economic and environmental goals are incompatible as they currently stand. The neo-liberal economic model is, arguably, much to blame for this problem. Since short-term exploitation of natural resources often can create maximum economic benefit.

Since the weak definition of sustainable development permits "sustainable growth", even though current patterns of economic growth and genuine sustainability are incompatible, it becomes a contradictory concept (Pepper 1996). Indeed it misses the long term, in Western society during the past generation, most official long-term planning has been at most three to five years. Many international stock and currency traders even think of a few weeks as long term.

In the strong sense, sustainable development implies certain limits e.g. consuming resources proportionate to their capacity to regenerate, rather than consuming them until they are depleted and then trying to substitute them with something else. (Connelly and Smith, 1999).

However, the sustainable development concept alone would prove too ambiguous and open too much interpretation, therefore we can couple it with the precautionary principle in order to reduce ambiguity. Indeed when some speak of sustainable development they often imply the "precautionary principle".

The precautionary principle

The “precautionary principle” or “precautionary approach” challenges an overemphasis on reductionist science and the still prevalent belief that science will enable humans to transcend natural laws that restrict other species. As described by many international agreements among others the Rio declaration (1992: principle 15) that has been accepted by the United Nations, and the European Union (Cameron and O’Riordan 1994) it calls for;

“where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation”
Rio declaration (1992: principle 15)

The precautionary principle often encompasses some commonly reoccurring themes:

- ◇ A willingness to take action in advance of formal justification of proof
- ◇ Proportionality of response
- ◇ A preparedness to provide ecological space and margins for error
- ◇ A recognition of the well-being and interests of non-human entities
- ◇ A shift in the onus of proof onto those who propose change
- ◇ A greater concern for impacts on future generations
- ◇ A recognition of the need to address ecological debts

(Raffensperger and Tickner 1999)

The rationale for the precautionary principle is fairly straightforward (Raffensperger and Tickner 1999).

Often the actions to restrict potentially dangerous activities are seldom taken until science has established a causal association between a substance or activity and a well-defined, single adverse impact. To prove this causality can take both time and resources. During this research period, action to prevent potentially irreversible human and environmental harm is often delayed in the name of uncertainty and the harmful activity continues. Sometimes, it may not even be possible to demonstrate a clear causal association in complex human/ecological systems.

The implementation of sustainable development fueled by the precautionary principle, if it ever occurs on a significant scale, will be contentious because it is perceived as a deadly threat to many financial interests. However, some contrary evidence (Hawken et al. 1999) provides examples of environmentally sensitive, profitable industries. Although Hawken and colleagues do not emphasize the precautionary principle per se, they do promote the protection and enhancement of natural capital, which is a primary goal of the precautionary principle.

At the heart of this is according to some scholars the governmental subsidies that to a large extent warp the cost vs benefits of many industries (Mabey and McNally 1998, Oman 1999). Myers & Kent (1998) state that a number of goals of both the precautionary principle can be achieved merely by eliminating perverse subsidies. This elimination will doubtless be fiercely resisted by special interests benefiting from the subsidies. Even so, Myers & Kent (1998) include a number of case histories where perverse subsidies have already been eliminated, although, in some cases, saving money was arguably more important than protecting natural capital.

To act rationally

Rational A. adj.

Having the faculty of reasoning; endowed with reason. (Freq. in rational being, creature). Exercising (or able to exercise) one's reason in a proper manner; having sound judgment; sensible, sane. (Oxford English dictionary 2002)

The word “rational” is sometimes used in political and ideological argumentation as a way of undermining arguments from women, peace, environmental or similar alternative movements. Such movements are often accused of being irrational and overly emotional, since they reject “technological” rationalism. However it has been suggested that this conflict is partly due to misunderstandings and miscommunications. Those accusing others of being irrational, are often less rational than they perceive themselves. (Thuren 1991)

The word “rational” is closely related to “sound judgment” and “common sense”, however, it is different from reason and sense. It is important to realize that there is no “rational” thinking per se, a decision is only rational in relation to;

- ◇ What objectives one has, which in turn depends on the decision makers personal values
- ◇ What knowledge one has, which in turn depends on the decision makers perception of reality

So to define: To act rationally is to; given ones knowledge, choose those means that through highest probability allow ones goals to be met. (Thuren 1991 p. 120 (authors translation))

Indeed, a person who has set aside four hours for a mountain trek that can be accomplished in less than one hour is not making an irrational choice if the person takes some extra time to enjoy the nature. Similarly a person who is lost at sea without compass or map is also not irrational. However, if the same person had a compass and map he would be making an irrational choice if he chooses not use them and takes the chance he will not get lost.

Since rational action according to Thurens (1991) definition, depends on personal values it does not have to be beneficial to society, the killer planning the perfect crime is no less rational than the fireman risking his life to save others. Because, rational action also depends on ones perception of reality and thus if the killer shares societies general perception of reality and values, he would change his mind before killing somebody. Since even though his values condone the action, his knowledge about societies values will tell him that it is an action society would not condone thus he has little to gain from working against society. As such, if science concludes certain activities to be unsustainable, then the rational person would seek alternatives.

However, sometimes people do not think or act rationally, in order to illustrate how rational thinking can turn irrational with time we go back to the fall of the Aztek empire (Box 1).

Box 1 Illustration of rational thinking

The Aztec empire dominated present day Mexico around the 16th century. The Aztec state was strong and wielded a lot of influence. The empire was large for the time and consisted of roughly 5 million inhabitants and spanned from the Mexican gulf to the pacific sea, it's capital of 60000 was roughly where present day Mexico City resides.

The Aztecs were a notoriously vicious and brutal people, every year the Aztec army would campaign to acquire slaves, bounty, new lands and quench uprisings. The Aztec empire was governed by Montezuma, the Aztec king, between the years 1502 and 1520. Montezuma was a competent warrior who had personally lead several successful campaigns that served to substantially increase his kingdom.

In 1519 the Spanish officer Herman Cortéz lands on the Mexican coast, with some 600 men and 17 horses and 10 pieces of artillery. Cortéz's goal was simply to conquer the Aztec capital. When news about the Spanish landing reached Montezuma's court he summoned his council. The question at hand was "how to deal with the Spanish?", a question linked to "how should the visit be understood?". Some of Montezumas council believed the Spanish to be a foreign embassy – this was very much in line with how the Spanish would choose to introduce themselves – and proposed a friendly welcome. Others thought the Spanish to be a threat and suggested hostile action. Finally some argued that the Spanish were supernatural creatures noting their "grey faces", their metal clothes, their floating houses with wings, their magical fire that could kill at great distance and their remarkable creatures that carried the Spanish leaders upon their backs. To complicate things the Aztecs had an ancient legend that told of the god Quezacoatl who had once traveled eastward and was destined to return some day. If the Spanish were supernatural creatures resistance would be futile.

Montezuma choose to support the Quezacoatl legend. Since resistance would prove useless Montezuma made a decision that, arguably, was the worst possible thing he could have done; Montezuma ordered treasures be sent to the Spanish delegation, thus Montezuma revealed his great wealth for his enemy. Sadly this only made the Spanish more determined to conquer the Aztec capital, now fueled by greed they dreamt of wondrous treasures. The Spanish pressed on towards the capital and the Aztecs did next to nothing to hinder them; instead the Spanish were welcomed by traditional ceremonies and escorted into the palace. All this time the Aztec army was waiting outside the capital for the signal to attack, but, none was given. Even though the Aztec army was nearby, the Spanish choose to place Montezuma captive in his own palace.

Due to the Spanish's never-ending greed and demand's doubt about their divinity became widespread, and following a dispute in which two Spaniards were killed there was no doubt the Spanish were as human as the Aztecs. However Montezuma remained cautious and took no further action. Montezuma was soon stoned to death by his own people who viewed him as a coward and traitor. The following battles between the Spanish and Aztec army were fierce, but eventually the Aztecs lost and the Spanish conquered the Aztec empire.

Was Montezumas governance an act of insanity and irrationality? Not necessarily at first. Given the Aztec knowledge and worldview assuming that the Spanish were supernatural was legit. Montezuma's choice, that later would be proven wrong, was not at the time irrational. However when it became obvious that the Spanish were mere mortals Montezuma started to act irrationally when he continued along the same path he had set out upon. In order for Montezuma to act rationally he would have had to give the army order to attack since given the above definition it is irrational to act against better judgment.

-Adapted from Tuchman B 1985, Dårskapens vägar, Atlantis Stockholm 1985 (in Thuren 1991)

As Montezuma persons making what seems a rational choice end up later realizing this was not the case. The important thing is to adapt ones efforts. Sometimes many people making similar and in their mind

rational choices can often due to the scale of things give unpredicted results. A theoretical model for this is called “the tragedy of the commons”.

The Tragedy of the Commons

When dealing with commons economists tend to refer to “the prisoners dilemma” as a paradoxical case in which individually rational behavior leads to collectively irrational results. “The prisoners dilemma” illustrates the commons problem, first voiced in 1968 by the ecologist Garrett Hardin who wrote an article in Science magazine that explained “the tragedy of the commons” (Hardin 1968). In essence Garret Hardin formulated what has become the most basic understanding of why environmental problems arise (Hardin 1968). The basis is that the environment is a common resource that is open for people to freely exploit and this very openness, combined with human nature, ultimately leads to ruin. The classic example is village commons (a grassy pasture in the center of the village) where farmers are free to graze their animals. Each farmer views the use of the commons as free and thus has the incentive to make his herd as big as possible. Indeed the benefits that each extra cow brings are reaped by its owner, but the costs of the extra strain it puts on the grass are shared among all the users of what is held in common. The costs are externalized. However, as all other farmers make the same calculation, the commons is soon overgrazed to the point where it can no longer support anyone's herd. Individually rational behavior deteriorates into collective ruin. Lately Hardin's thesis has been used to explain the decline of many global commons such as fisheries, the atmosphere and common water resources. As many Internet users have discovered, the tragedy of the commons can also play out as a network phenomenon when there is free, unlimited access.

Hardin recognized two ways to avoid overexploiting commons. One way is to privatize them, so that the owner has both costs and benefits. Now he has every incentive not to overgraze. The other is to regulate them by having an outside agency with the force of law behind it, a government, in short -restrict the number of cattle.

At the time Hardin published his article, the latter solution was very popular. Governments throughout the world reacted to the mere existence of a commons problem by grabbing powers of regulation. Most profound, in the Indian subcontinent communally exploited forests and grasslands were nationalized and put under the charge of centralized bureaucracies far away. This might have worked if governments were competent and incorruptible, and had bottomless resources to police their charges. But sometimes it made problems worse, because the forest was no longer the possession of the local village even collectively. So the grazing, poaching, and logging intensified since the cost had been externalized not just to the rest of the village but to the entire country. (Primack 1998)

In order to take one example, the structure of pollution regulation in many countries illustrates a centralized solution to a commons problem. Bureaucrats decide, in response to pressure from lobbyists, exactly what levels of pollution to allow and even specify the technologies to be used (the so-called “best available technology” policy). This creates a lack of incentives for polluters, because it makes pollution free up to the threshold, and so there is no encouragement to reduce pollution further. If, instead, the polluter had to buy a quota from the government, it would have an incentive to drive emissions as low as possible to keep costs down and the government would have a source of revenue to spend on environmental protection. The US 1990 Clean Air Act set up a market in tradable pollution permits for sulphur-dioxide emissions, which is a form of privatization. However, even this solution is according to some scholars (Oman 1999, Mabey and McNally 1998, OECD 1997) flawed in a similar way. Since setting the correct price in a national market governed by national stakeholders that in actual fact is established to reflect the international stakeholders and their inherent costs is difficult. For example, taking the US 1990 Clean Air Act the price set on any emission is in accordance with the US government and the business operating within the US (these are the stakeholders) will, arguably, never reflect the costs inferred upon third world countries (who share the common with the US) especially if the businesses that set the price of emission (in accordance with market forces) are competing on a global market with global actors who are not under the influence of the US 1990 Clean Air Act. Since it is not in any of the stakeholders interests to put business in the US out of business, the actual price paid in the market will never, mostly due to outside competition, reflect actual cost.

So in order to truly overcome the tragedy of the commons that stretch beyond sovereign countries borders generally requires all users to gain a common understanding that all will benefit if individual action is restrained. In the case of the environment, this is a classic collective action problem where resolution requires large numbers of dispersed, dissociated individuals to take coordinated actions. The problem is especially acute in regards to global ecosystems because the environmental damages are spread among all members of the planet, while costs of reversing the damage are concentrated among a smaller group of polluting industries or countries. The groups currently responsible for the problems are in the advantageous position of being smaller in number and able to coordinate their substantial resources to resist any change that threatens their interests. On the other hand, the diverse groups of global beneficiaries of environmental protection policies have much greater difficulty in coordinating their responses. This creates a highly inequitable situation that is a driver of ongoing environmental destruction.

Righting this imbalance requires greater international environmental equity. Equity, in the case of global ecosystems, is a fair and just distribution of the benefits, burdens, and decision-making authority associated with improving international environmental quality (Harris, 2001). Unfortunately, most countries have been reluctant to take action on addressing equity issues. However, the mass media has turned out to be an equalizer to some extent in the collective action challenge (Arquilla and Ronfeldt, 1997; Harasim, 1993) by giving the previously disadvantaged a medium and an audience to their say in international environmental issues.

Communication of science

Julian Huxley, in the process of carving out a niche for himself as a popular science writer in the 1920's, offered the simple credo; that it is part of scientists duty to make available to the lay public the facts and theories of their science, and especially to try and re-create something of the mental background that is engendered by those facts and theories (Huxley 1926). But how much can one understand about the world by studying words on a page? The question is as old as reading. The communication of science, and persuading others that one's results are sound are at the heart of this, and has relied heavily on written accounts ever since the scientific revolution. (Briggs A and P Burke 2002)

Concern over the relationship between the public, science and technology seems to be an important theme of contemporary societies. There is as expected some disagreement among scholars regarding what role science should play. A science centered view argues that science is important in order to further our knowledge of the world around us. While, other scholars take "tragedy of technology" view and claim that science is destructive to our lives. However since this is not the primary focus of this paper those interested can look into the works of Nehru, Haldane, Habermas and Hill (Nehru in Perutz 1991, Haldane J B S 1939, Habermas J 1971, Hill 1988) who present a detailed account of this discussion. But before we can move on it must be clear where this paper positions itself in this debate, and some understanding of the rations behind this stance is called for.

It is clear that science needs people as noted by Harlen;

"The importance of a scientifically and technologically literate population is being emphasized in all countries, since it is recognized that specialist scientists and technologists cannot operate without a knowledgeable supporting public" (Harlen 1993 p 126)

On the notion of whether the public needs science or not, this paper takes the position of science as crucial to "improved public understanding". That is if the science results in technological improvements which deteriorate the environment, then this is solved by further scientific investigation from which knowledge can help identify those problems and solutions proposed. The recognition that critical and rational science is an enterprise crucial to the welfare of Western societies is commonplace, along with the recognition that public acquaintance with science is equally essential. (Scanlon et al 1999)

Habermas (1989), a champion of the Frankfurt School identified a central social problem (alienation and the passive consumption of co modified culture) and suggested a resonant resolution (public communication). In this effort he was engaged in a very ancient and human quest that has been debated since the Greek philosophers. (Habermas 1989)

Humans dominating others, to Habermas, are most clearly exhibited in the dominators preventing the subordinates from communicating publicly. At the core of any democracy is political conversation. It is in a Rational-critical debate that Habermas finds antidote and alternative to commodity-consumption culture. To flourish, democracy demands continuous conversation, open argumentation, and debate. Habermas idea that liberation can only be achieved through a regeneration of the public sphere is expressed by Huspek (1997) "For Habermas, our alienation from the world, self, or other is largely a by-product of the exigencies of institutional life which have denied us the opportunity to freely, openly, and honestly communicate in the form either of initiating or challenging validity claims." (Huspek, 1997 p 269)

Here is a selection of Habermas's conditions for public sphere discourse:

- ◇ The form and content of the debate must be rational-critical. (One must support one's thesis with verifiable facts. Consistency and causality must be adhered to.)
- ◇ Only civic, common concerns may be discussed--the private (whether emotional or financial) is disallowed.
- ◇ Participants should bracket status differentials and deliberate "as if" they were social equals.
- ◇ The process must be limited to the forming public opinion; it can never become one of actual decision-making and self-management.
- ◇ A single, comprehensive public sphere - where consensus can be achieved - is always preferable to a complex of multiple public spheres.

(Habermas 1989)

One of the most important areas of science communication is that which takes place through the mass media. (Scanlon et al 1999) Today the term "mass media" includes everything from news papers and television, through magazines and films/video to digital broadcasting of various forms. This communication takes place through various genres that include but not restricted to; specialist TV programs, science fiction, magazines for lay and specialist audiences and general news coverage. It is this later genre that this paper will focus upon and limit its debate too.

Science in the mass media

Miller (1998 in Scanlon et al 1999) suggests the mediation of science via the mass media is best viewed from the context of the "circuit of mass communication" thus engaging a rather holistic view he argues that the mediation of science is a complex phenomenon that involves a large number of contending and cooperating groups. The "circuit of mass communication" can be expressed as a product of four sets of actors:

- ◇ Social and political institutions (governments, business, interest groups, universities etc.)
- ◇ The media (press, radio, television etc.)
- ◇ The public (divided by class, gender, ethnicity etc.)
- ◇ Decision makers (local, national, supranational government, business, universities etc.)

(Miller et al 1998 in Scanlon et al 1999)

Miller (Miller et al 1998 in Scanlon et al 1999) argues that these actors must be seen as one entity and examination of merely one part may give false results. That blaming the media for transmitting inaccurate science ignores the complexity of the interactions occurring. One must also consider the influence of the framework which the media works within.

Since it is clear that the media has a big influence over public thinking, it can for example make people think about the science-related issues it reports upon. It can "set the agenda" for public discussion, influence public understanding, public belief and even behavior. This behavior can be illustrated by this example, when researching food scares Macintyre et al (1998) found a respondent that started by saying that she did not know much about salmonella but then proceeded to quote official advice about cooking eggs. When asked how she knew, she responded:

“I don’t know really, I suppose it just seems like common sense. But I must have got it from somewhere. I suppose I picked up a lot of things from the magazines that I read and there were a lot of people saying things on TV about how to cook eggs. Isn’t that funny, I just thought I’d always done that naturally” (Macintyre et al 1998 quoted in Scanlon et al 1999 p 221)

The mass media is also capable of bringing greater equity to international policy debates as the November 1999 protests of the World Trade Organization Ministerial meeting in Seattle exemplify. While most of the mass media images of the protest focused on groups of anarchists smashing Starbucks Coffee shops, the reality of the event is much more complicated. Less dramatic than the Seattle protests, but possibly more significant, have been the dialogues forced with the World Bank and WTO over the environment and indigenous peoples, the OECD over the Multilateral Agreement on Investment (Kobrin, 1998), the inclusion of environmental side agreements in the North American Free Trade Agreement and the impact of IMF structural adjustment policies on local communities (Walton and Seddon, 1994). These international organizations, accustomed to making decisions in seclusion, are now being forced to increase transparency and the participation of civil society in decision-making.

Opening historically closed international governmental organizations to a larger debate about how the global environmental commons should be managed is only one example how the mass media can help increase equitable participation. It is still too early to tell if this will improve the environmental conditions and overcome the tragedy of the commons. It is also unclear if this can advance legitimate economic development goals while balancing environmental and equity issues. What is clear, though, that the mass media will play an ongoing role in reaching any new balance.

The examples above show how mass media messages can influence everyday conceptions of the world. As such it is interesting to examine how well messages in media correspond with the scientific findings they are trying to communicate. While taking the knowledge acquired from the “circuit of the mass media” in order to try for a more holistic explanation.

News values

Over the last few decades there has been a considerable amount of work on news values. However, there is as of yet not complete agreement on categories and terminology. A few concepts of considerable importance to sustainable development issues will be considered here. (Galtung and Ruge 1965, UNESCO 1975, Mencher 1977, Bell 1991 and Lundgren et al 1999).

These news values can for structure be divided into universal or culturally independent factors and culturally dependant factors.

Universal independent factors

- ◇ Frequency: How well a story fits with daily news cycles
- ◇ Timeliness/Topicality: The way an item is close in time, place or both
- ◇ Unambiguity: Issues should be clear cut and contain few uncertainties
- ◇ Meaningfulness/Relevance: Cultural proximity, or how much people care about certain issues
- ◇ Unexpectedness: Degree of surprise
- ◇ Threshold: The level at which a story can become news, eg numbers killed etc
- ◇ Continuity/Currency: Events and situations that are being talked about, news creates news
- ◇ Cooption: Similar stories follow successful ones
- ◇ Competition: Is the story exclusive
- ◇ Composition: Balance between social affairs, foreign, crime, politics etc.
- ◇ Consonance: How well a story fits with news producers preconceptions
- ◇ Predictability: Extend to which events are scheduled by PR operatives
- ◇ Conflict/Controversy: Events should reflect drama or conflict between individuals or institutions

Culturally dependant factors

- ◇ Elite ness/Personification/Personalisation (Nations, Persons, Sources): Nature is an elite source, The US president is the most elite person in the US etc.
- ◇ Facticity: Number of facts in a story
- ◇ Negativity: The best news are bad news

Source (Galtung and Ruge 1965, UNESCO 1975, Mencher 1977, Bell 1991 and Lundgren et al 1999)

Detailed explanation of the individual factors later. But essentially news values are a way of classifying events into a number of different factors. The better or more factors any event fits, the more desirable any event will be with regard to its chances to take up media space i.e. the greater the likelihood of it being reported by the media.

Part III Climate Change

The problem of Climate change

“With the current levels of emissions the human race has set out upon the largest uncontrolled biological experiment in history. This experiment has uncertain outcomes that may result in unprecedented changes incurred upon our civilization” – Adapted from unknown

The main source for this chapter is the science produced by the UN Intergovernmental Panel on Climate Change (IPCC).

When the United Nations Environment Programme and the World Meteorological Organization launched the IPCC in 1988, no one could imagine how effective and influential its work would become. Everyone agrees that environmental information must be based on sound science. Prudent policy choices must be rooted in rigorous, careful, rational and balanced analyses of the best scientific and technical information. In this sense the IPCC has shown the way, developing a process which engages hundreds of the world’s leading experts in reviewing the most up-to-date, peer-reviewed literature on the scientific and technical aspects of climate change. The IPCC integrates its assessments into a policy-relevant format universally accepted as a basis for decision-making by the 185 member governments of the United Nations Framework Convention on Climate Change.

In a joint statement in *Science* magazine issued by the Australian Academy of Sciences, Royal Flemish Academy of Belgium for Sciences and the Arts, Brazilian Academy of Sciences, *Royal Society of Canada*, Caribbean Academy of Sciences, Chinese Academy of Sciences, *French Academy of Sciences*, German Academy of Natural Scientists Leopoldina, Indian National Science Academy, Indonesian Academy of Sciences, Royal Irish Academy, Accademia Nazionale dei Lincei (Italy), Academy of Sciences Malaysia, Academy Council of the Royal Society of New Zealand, *Royal Swedish Academy of Sciences*, Turkish Academy of Sciences, and *Royal Society (UK)* give credit to and support for the IPCC’s work.

“The work of the Intergovernmental Panel on Climate Change (IPCC) represents the consensus of the international scientific community on climate change science. We recognize the IPCC as the world’s most *reliable* source of information on climate change and its causes, and we endorse its method of achieving this consensus. Despite increasing consensus on the science underpinning predictions of global climate change, doubts have been expressed recently about the need to mitigate the risks posed by global climate change. We *do not* consider such doubts justified.

...There will always be some uncertainty surrounding the prediction of changes in such a complex system as the world’s climate. Nevertheless, we support the IPCC’s conclusion that it is at least 90% certain that temperatures will continue to rise, with average global surface temperature projected to increase by between 1.4° and 5.8°C above 1990 levels by 2100.” (Statement, Joint 2001)

The IPCC is a cautious body, and if the evidence is not available in the peer-reviewed literature to support a statement, it will not make it. Indeed when it comes to conservatism, it should be recalled that the IPCC was under considerable pressure in 1990 to make a statement attributing observed climate changes to human influence “because if they don’t, someone else will” (and, indeed, did). In the end, this watchfulness resulted in the attribution statement made in the Second assessment report (IPCC 1995) having a much greater impact than if it had been made prematurely. (M. Allen et al 2001)

The IPCC has performed three major assessments (assessment reports) of the state of knowledge and degree of understanding of climate science. The first (FAR) and second (SAR) assessment reports were published in 1990-2 and 1995, respectively, and the third (TAR) in March 2001. For TAR more than 100 lead authors, 500 contributors, 20 review editors, and 700 reviewers were involved.

The IPCC’s three-volume TAR defines climate change as “any change in climate over time, whether due to natural variability or as a result of human activity” (IPCC 2001a p22). Based to some extent on past assessment reports (IPCC 1995, IPCC 1992), but also on new research the IPCC report gives evidence for climate change. Its message is clear: intensive climate research and monitoring gives scientists much greater confidence in their understanding of the causes and consequences of “increased global average

surface temperatures (and rising temperatures in the lower eight kilometres of the atmosphere)” (often referred to as global warming) (IPCC 2001a). The Assessment presents a compelling snapshot of what the earth will probably look like in the late 21st century, with even greater changes are expected in the more distant future. (IPCC 2001a)

The greenhouse effect and concerns about it

The physical principle of the greenhouse effect is well established (Miller 2002, Parry and Carter 1998). Put simply, the earth’s surface temperature depends upon the balance between incoming short-wave energy from the sun and outgoing long-wave energy emitted from the earth’s surface, according to Stefan’s law, and atmosphere. Radiative forcing describes two opposite impacts related to this radiation balance: Negative radiative forcing, which can be caused by aerosols, tend to cool the surface by reflecting short-wave radiation more effectively than long-wave radiation. Whereas positive radiative forcing warms is caused by some gases (often termed “greenhouse gases”) in the atmosphere that allow the sun’s short-wave radiation to pass through and warm the earth’s surface, and at the same time these gases act to trap some of the long-wave radiation emitted from the earth’s surface, thus keeping the earth’s surface somewhat warmer than it would otherwise be (thus acting as a blanket of sorts). If these natural “greenhouse gases” did not exist (most important of which is water vapour) the earths surface would roughly become 32° C cooler in other words average temperature would be below the freezing point of water or roughly -17° C. Consequences of this would range from changes in species biodiversity to changes in biological services; however, it goes without saying that without the “greenhouse gases” effect humans would not have evolved to anything like our present day civilisation. (J. Bennett et al 2003, E. Chaisson and S. Mcmillan 2001)

When looking at Venus a planet not very different from the earth, other than distance from the sun, perhaps one notices that it has trapped much more greenhouse gases within its atmosphere than the Earth. But when realizing that it’s average surface temperature of 470° C is due a “runaway greenhouse effect” (without its greenhouse effect Venus would average -43 ° C, giving a greenhouse warming of 513 ° C as compared to the earths current 32 ° C) the Achilles' heel of not controlling greenhouse gas emissions become clear. Concern arises since human activities are increasing the concentration of “greenhouse gases” in the atmosphere, particularly carbon dioxide (CO₂) and methane. While these facts stand uncontested, the implications for changes in average global and local temperatures are less certain. Furthermore the effects of such changes on rainfall and storm patterns – floods and droughts – and on other aspects of our environment are difficult to predict in detail, although the broad outline seem clear. In what follows these themes will be expanded upon and some likely scenarios drawn up (guided largely by the IPCC’s work). (J. Bennett et al 2003)

Greenhouse gases up to today

Concentrations of the greenhouse gas CO₂ in the atmosphere has increased by 31% the last 100 years (figure 2). If current trends in the use of fossil fuel use persist, CO₂ will be present in the atmosphere at twice the pre-industrial concentrations. Once concentrations of CO₂ in the atmosphere have increased they take a long time to decrease, typically around 100 years, even if no more CO₂ is added. Thus similar to turning a large sea vessel there is a lag between actions aimed at reducing CO₂ and subsequent decrease. This is a strong argument for early action when it comes to leveling of CO₂ releases. (J. Bennett et al 2003, IPCC 2001a)

Other greenhouse gases, including Methane (CH_4), Nitrous oxide (N_2O) and Chlorofluorocarbons (CFC's), also contribute to the greenhouse effect. They have also increased in concentration in the atmosphere. Methane levels have increased 150% since 1750. Nitrous oxide levels are currently rising at .25 % per year. As with CO_2 all these increases are clearly caused by human activities, largely connected with energy production, transport and agriculture. (IPCC 2001a)

However, CO_2 contributes the most to human caused global warming accounting for roughly 70 percent of the total. While the other gases contribute the remaining 30 percent, with methane being the most important out of these (illustrated by figure 3). (IPCC 2001a)

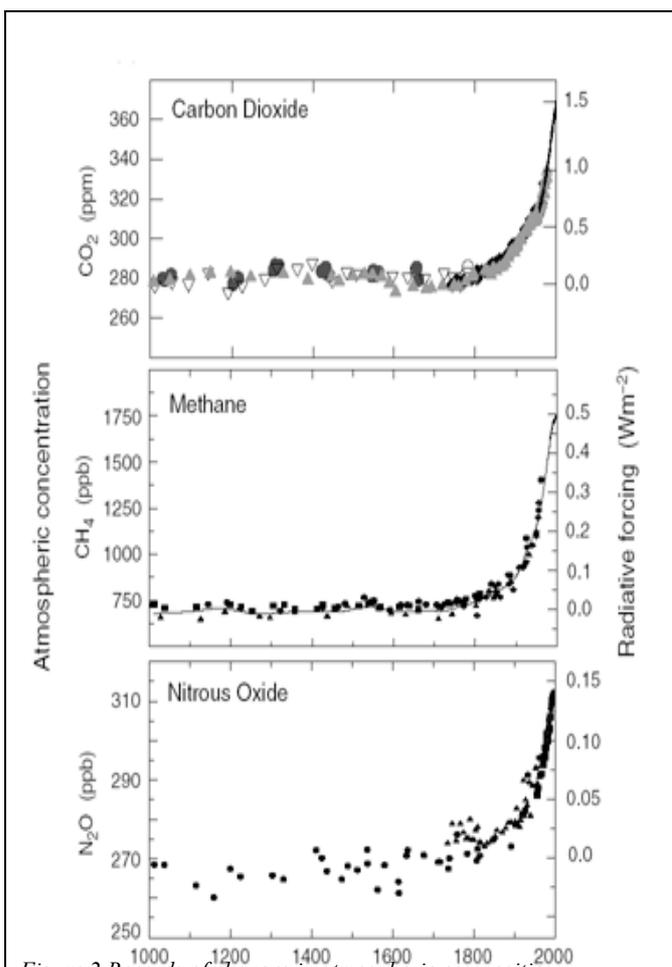


Figure 2 Records of changes in atmospheric composition. Atmospheric concentrations of CO_2 , CH_4 and N_2O over the past 1,000 years. Ice core and firn data for several sites in Antarctica and Greenland (shown by different symbols) are supplemented with the data from direct atmospheric samples over the past few decades Source - IPCC (2001) p 36

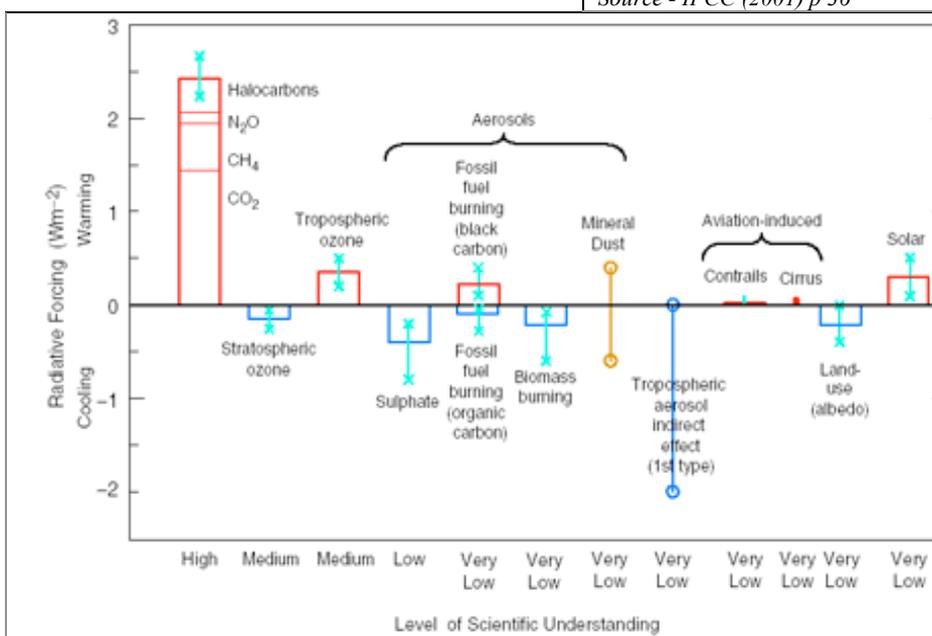
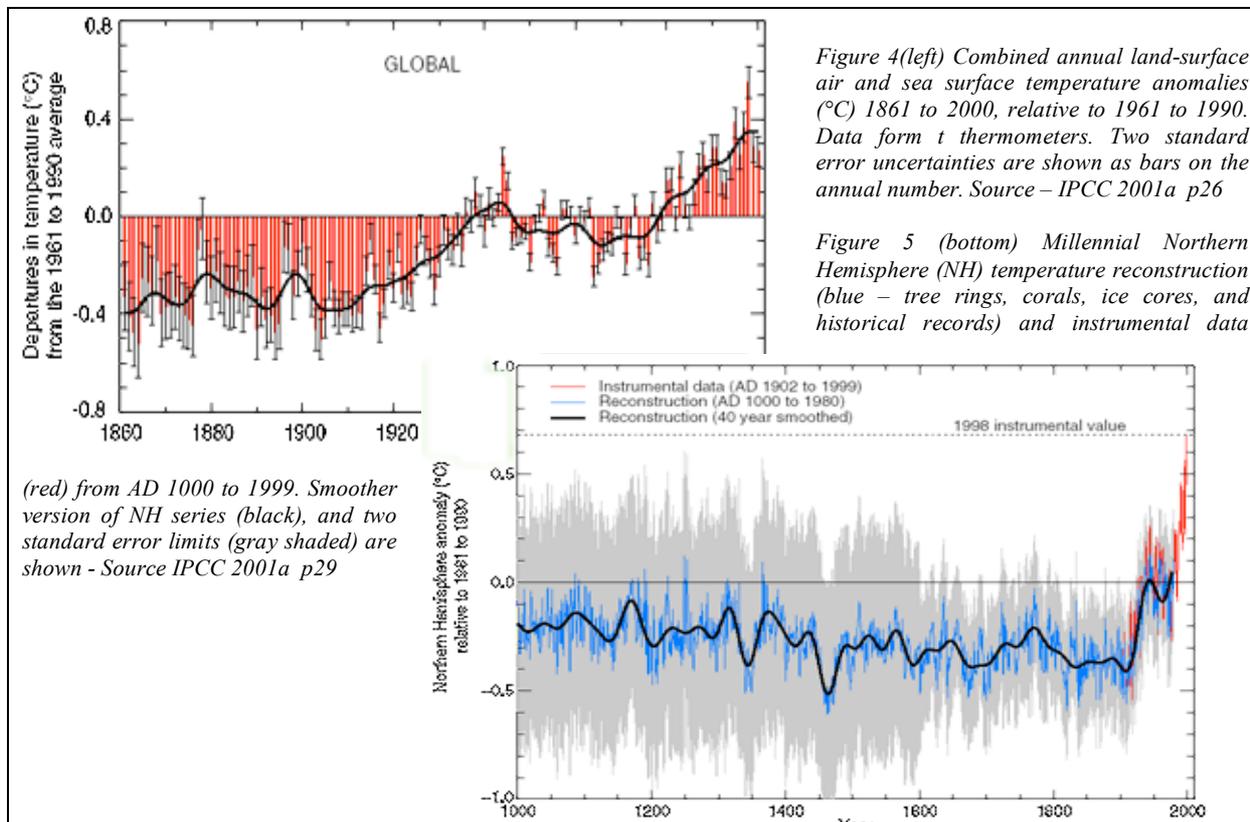


Figure 3 Global, annual-mean radiative forcings (Wm^{-2}) due to a number of agents for the period from pre-industrial (1750) to present (late 1990s; about 2000). The height of the rectangular bar denotes a central or best estimate value, while its absence denotes no best estimate is possible. Source - IPCC 2001a p 37

Greenhouse gases and global warming

Over the past 130 years average global temperature has risen about 0.6° Celsius (figure 4), this may sound trivial, however, the difference between today and the extreme of the last ice age 20000 years ago is only about 5° Celsius. The estimated range of variation in global temperature the last 1000 years is about 1° Celsius (figure 5).



Direct relationship between these temperature changes and human activity is complicated by the fact that the climate varies naturally from year to year. Long-term human-induced warming has to be distinguished from the natural background variations. This is complicated by the fact that we lack data on climate and emissions reaching back hundreds of years. However by comparing observations of global mean temperatures with natural variability estimated from climate models the IPCC finds “The warming over the past 100 years is very unlikely to be due to internal variability alone” (IPCC 2001a p56). Thus they conclude that “the balance of evidence suggests a discernible human influence on global climate”. (IPCC 2001a p 55)

Climate modeling

In order to conclude how increases in atmospheric CO₂ and other greenhouse gases will affect future global temperature and other climatic variables, very complex mathematical models of the earth’s climate system are necessary. While there is no dispute that for example, a doubling of CO₂ in the atmosphere would lead to at least a 1.5° C increase in global temperature other factors are more problematic to model. One of the problems is that not all factors have equal impact; also, most factors express a non-linear behaviour. Thus a doubled input of any factor does not always equal a doubled output; one and one is not always two in climatology. The next problem concerns feedback mechanisms. Often the models include feedback mechanisms that are capable of action to either reinforce in a positive or negative way. Thus some factors can either amplify or reduce global warming without directly being related to greenhouse gas emissions. The more important and most debated feedback mechanisms in climate models include water vapour, cloud cover, ocean circulation, reflection from icecaps, wetland surfaces and land glacier cover to name a few. (Smith et al 2002, IPCC 2001a, Allen et al 2001)

The effects of cloud cover, for example, is an area of debate, clouds reflect some solar radiation back into space thereby reducing global warming effects. However, they counter this action by reflecting some of the earth's radiation back to the earth, thus increasing the temperatures. If there is a net warming or cooling action depends largely upon local conditions and the type of cloud (cloud temperature, height and optical properties). Generally speaking low clouds cool global temperatures, whereas high clouds tend to increase global temperatures. The feedback to the model can therefore be positive or negative, making modeling difficult, with the effects varying from place to place. (IPCC 2001a)

Ocean circulation is another important factor that can exemplify complications in creating the mathematical models used for predicting future climates. The oceans are important since they act as large heat reservoirs, redistributing heat through its circulations. However the time scales involved in the circulation are much longer than those involved in the atmosphere (typically decades), thus when calculating future temperatures the linkages between ocean and atmosphere and possible alterations in circulation must be taken into account. Also even quite small changes regional transportation by oceans can have large but, difficult to predict influence on local climate. However, this door swings both ways, small changes in local climate could result in large and probably abrupt changes in ocean circulation. Such as the Gulf Stream changing distribution and flow pattern. All this presents some uncertainties essentially at the regional level. (Miller 2002, Smith and Reynolds 2002, IPCC 2001a)

An important feature of non-linear systems is that, under certain circumstances, a minor change in a forcing or key variable (for instance atmospheric CO₂) can lead to large or abrupt changes in dependant variables (such as ocean circulation). A good example of this is the disruptions seen in the El Nino system. The El Nino is a region of unusually warm water that appears every 3-5 years in the equatorial pacific area, which strongly influences weather patterns especially in the tropic/sub-tropic regions. In recent years extreme El Nino phenomena have been recorded, which are thought to have lead to heavier storms and droughts than normal in the Americas, Australia and Africa. If global warming continues the extreme weather events like those seen as a consequence of El Nino are likely to become more common. (Miller 2002, IPCC 2001a, Lau 1997)

What the computer based climate models predict

Due to the immense amounts of data that must be taken into account in order to analyze climate change systematically, computer models are normally employed. These computer models simulate climate changes over different time-scales, this gives the scientists the possibilities to for example, on a historic time-scale compare the modeled simulation results for the 20th century with the measured data for the same epoch. In this way the models quality can be evaluated. However, the most useful application of climate models is not modeling the past, but, rather modeling the future. When this is done, predictions for human interferences with climate systems are as important as the models validity. Therefore, the computer simulations must be based on plausible assumptions about future paths or what Bossel (1998) calls "riverbeds of the future", Bossels riverbeds are put simply projections of different paths of development and consumption and the implications and impacts of these. Scenarios are the now commonly used term for these different conceivable assumptions. (IPCC 2001a, Jürgens 2001)

In 1992 the IPCC presented six different scenarios – the IS92 scenarios – that project greenhouse gas emissions to the year 2100. These scenarios have been updated in the TAR (IPPC 2001) with regard to changes in methodology and drivers of emissions and developed into 40 different scenarios representing four discrete narrative storylines of development. From these scenarios six marker scenarios were chosen by the IPCC to best illustrate the various features of the four storylines;

- ◇ A1 storyline describes a future of very rapid economic growth. The global population peaks in mid 200 and starts to decline thereafter. There is rapid development and introduction of energy efficient technologies. The storyline features cooperation across all regions (some similarities too Bossels (1998) partnership scenario) that creates economical equity across regions.
- ◇ A2 storyline describes a future of diverse regions with underlying self-reliance and preservation of local identities. It features a continuously growing population, primarily regional economical development resulting in fragmented economical growth in addition to slow and fragmented technological change (much like Bossels (1998) competition scenario)

- ◇ B1 storyline describes a congregate world with the same global population, that peaks mid century and declines thereafter. The economy shift rapidly towards a service and information society, with reductions in material intensity and introduction of clean efficient technologies. The scenario focus is global solutions to economic, social and environmental problems with sustainable development methodology. (much like Bossels (1998) partnership scenario)
- ◇ B2 storyline describes a continuously growing population, although lower than A2. A world of local sustainable development focus on problems, intermediate economic growth, less rapid and more diverse technological change than in the A1 and B1 storyline.

The marker scenarios chosen by the IPCC reflect these storylines are named accordingly A2 B1 and B2 after their storylines, while the A1 storyline is represented by A1FI, A1T and A1B all different in assumptions regarding their technological developments. A1FI is fossil fuel intensive, A1T describes non fossil fuel use for energy and finally A1B is a balance of sorts not relying to any extend on any one particular energy source (assumes equal reliance and technological advances for all energy sources).

The TAR predicts that after taking all the feedback mechanisms into account (M Allen et al 2001) that;

Concentrations of greenhouse gases in the atmosphere will range from 90-250% above the pre-industrial (1750) concentrations depending on gas and scenario. (See Figure 6 for details)

“The large growth in emissions of greenhouse gases and other pollutants as projected in some of the six... scenarios for the 21st century will degrade the global environment in ways beyond climate change. Changes projected in the SRES [Read marker scenario - authors comment] A2 and A1FI would degrade air quality over much of the globe... threatening the attainment of current air quality standards over most metropolitan and even rural regions and compromising crop and forest productivity” (IPCC 2001a p 65)

Consequently the IPCC experts expect temperatures to rise by 1.4 to 5.8 ° C compared to 1990 levels, depending on scenario (this figure includes the full range of all IPCC scenarios), with especially rapid rates of increase being expected over land and in the northern hemispheres during the winter months. (As illustrated by figure 7 and 8)

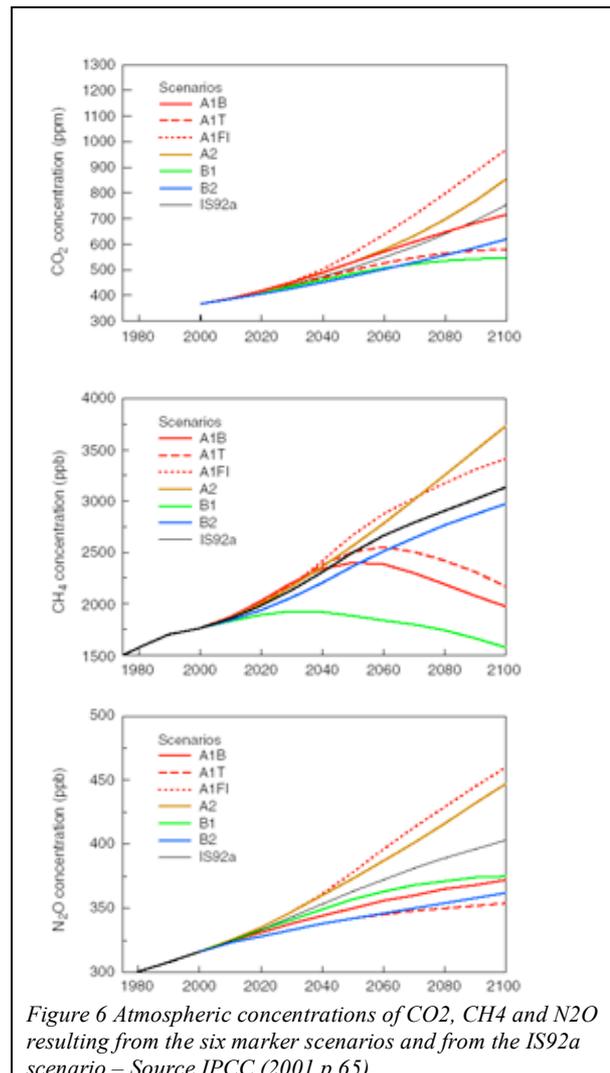


Figure 6 Atmospheric concentrations of CO₂, CH₄ and N₂O resulting from the six marker scenarios and from the IS92a scenario – Source IPCC (2001 p 65)

Projections over the consequences of this warming include among others;

- ◇ Sea level rises of 0.09 to 0.88 m, because of which extreme high water levels will become more commonplace. (IPCC 2001a)
- ◇ Glaciers and ice caps will continue their retreat, and snow cover and sea ice are projected to decrease further. (IPCC 2001a)
- ◇ Increased risks for extreme weather vents such as droughts and intense precipitation. Also cyclones will become more intense with higher peaks in wind force and speed. (IPCC 2001a)
- ◇ Distribution and diversity changes of many species of plants (Walter et al 2002, Mcarty 2001, Sturm et al 2001, Menzel and Fabian 1999)
- ◇ Increases in the potential transmission of many infectious diseases such as malaria, cholera, dengue and yellow fever. (Harvell et al 2002)

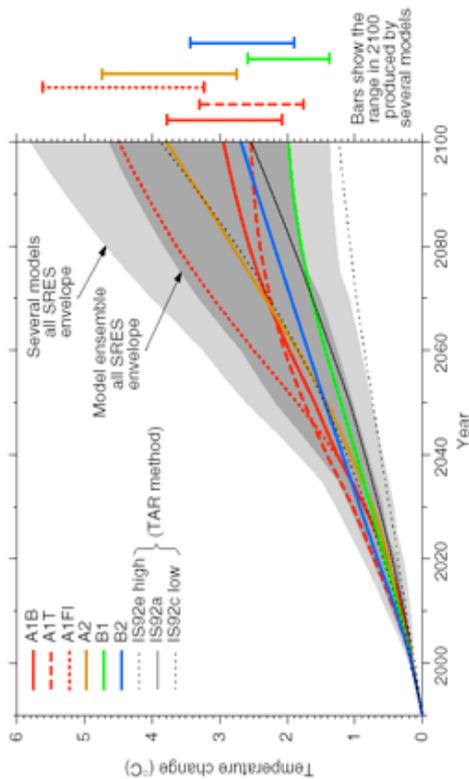


Figure 7 global mean temperature projections for the six marker scenarios, results are shown for IS92a. The darker shading represents the envelope of the full set of 40 scenarios using the average of the model results (mean climate sensitivity is 2.8°C). The bars show, for each of the six marker scenarios, the range of uncertainty – Source IPCC (2001 p70)

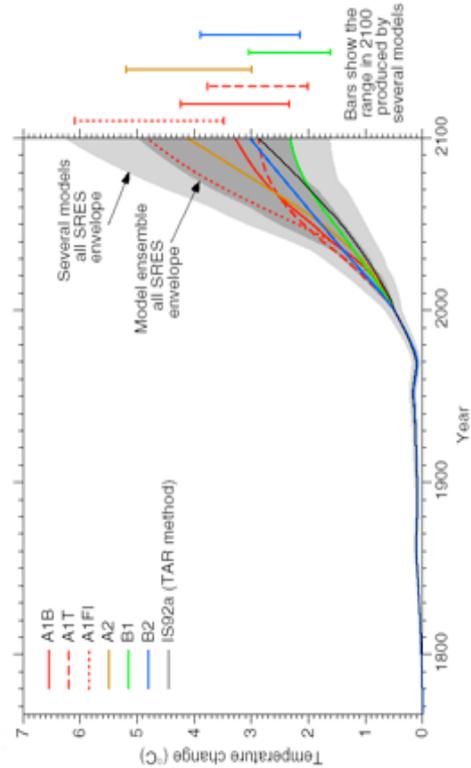


Figure 8 same as 7 but with longer time-scale but results using estimated historical anthropogenic forcing are also used – Source IPCC (2001 p70)

Benefits and costs of climate change

The consequences and costs of global warming are difficult to assess with any precision, however, the trends are very alarming and too immense to be given any lengthy account here. A few examples will be offered, but first a, perhaps, bold statement by a scholar researching effects of global warming;

“Long before the systems of the planet buckle, democracy will disintegrate under the stress of ecological disasters and social consequences... - Dr. H Kendall of MIT, the recipient of the 1990 Nobel Prize for Physics” (Gelbspan 1997 p 153)

In the near term, agriculture and forestry are likely to benefit from CO₂ fertilisation and increased water efficiency of some plants at higher atmospheric CO₂ concentrations. But the optimal climate for crops may change, requiring significant regional adaptations. Water runoff dictated by glacier melting and rainfall could affect pollution runoff and flood control. To exemplify the scale at which this will happen, alpine glaciers can suffice while keeping in mind it represents merely one of many adverse impacts predicted. Alpine Glaciers are observed to be in rapid retreat and many cities depend on these as reserves for their water supply. Lima in Peru is a city at great risk, its entire water supply for approximately 10 million people depends on the runoff from a glacier that is now in rapid retreat. Also for the last decade the lower reaches of the yellow river averaged 70 dry days a year. But in 1995 it was dry for 122 days. Since the warming we expect over the next century will happen at a rate much faster than has occurred in the last 10000 years most ecosystems will have trouble adapting, especially the most sensitive. Some estimate one

third of the world's wildlife and habitats and up to 70% of the northern hemisphere's habitats will have been fundamentally altered by 2100. (Miller 2002) Despite the fact that there may be some short-term winners and losers, in the long term it is likely that the costs of adaptation to the predicted warming will by far outweigh the benefits. (Miller 2002, Gelbspan 1997)

Summary of IPCC's predicted impacts and key uncertainties

The Earth's climate system has changed on both regional and global scales since the industrial revolution. Globally it is very likely (90-99% chance) that the 1990s was the warmest decade on record, with 1998 the warmest year. Much of this warming, especially the observed warming over the last 50 years is likely (66-90% chance) directly attributable to human activities such as burning fossil fuels. Key uncertainties are the magnitude and character of natural variability; how natural factors and anthropogenic aerosols affect climate forcing and relating regional trends to anthropogenic activities. (IPCC 2001b)

Carbon dioxide concentrations, globally averaged surface temperature and sea levels are projected to increase under all IPCC emission scenarios. Projections result in an increase in globally averaged surface temperature of 1.4 to 5.8 ° C over the period 1990 to 2100. This is roughly ten times larger than the observed warming of the 20th century and the rate of warming is very likely (90-99% chance) to be without precedent during at least the last 10,000 years impacting seriously on environmental and socio economic systems.

The projected robust findings (defined by the IPCC as "one that holds under a variety of approaches, methods, models and assumptions and one that is expected to be relatively unaffected by uncertainties" IPCC 2001b p 136) and projected impacts of climate change in the range very likely (90-99% chance) to likely (66-90% chance) range include;

Higher maximum temperatures resulting in more hot days and heat waves across nearly all land areas are very likely (90-99% chance), this will increase death and serious illness among the sensitive in society (elderly and poor), increase heat stress in livestock and wildlife, shift tourist destinations, increase risk of damage to crops, increase demand for electric cooling which in turn reduces energy supply reliability.

Higher minimum temperatures ensuing fewer cold days and cold waves over nearly all land areas are very likely (90-99% chance), in turn this will decrease cold-related human mortality, decrease risks of damage to some crops and increase risks to others, extend range and activity of some pests and diseases, reduce heating energy demand.

More intense precipitation is very likely (90-99% chance) over many areas inducing increases in floods, landslides, avalanches and mudslides, increased soil erosion. All this will add to pressures on government and private insurance systems.

Increased summer drying over most mid-latitude continental inlands are deemed likely (66-90% chance), this will in turn decrease crop yields, increased damage to human infrastructure foundations, decreased water quantity and quality and an increased risk for forest fires.

Increases in tropical cyclone peak winds and intensified droughts and floods associated with El Nino events are expected likely (66-90% chance) to occur inferring increased risks to human life, increased coastal erosion, increased damage to coastal ecosystems such as coral reefs, decreased agriculture productivity in drought and flood prone regions, decreased hydro-power in drought prone regions.

Overall climate change is projected to increase threats to human health, especially in the third world (with medium (33-67%) to high (67-95%) confidence), and alter ecological productivity increasing risks of species extinctions. Key uncertainties include assumptions (regarding economic growth, technological progress, population growth and governance structures) underlying the marker scenarios; factors in modeling of carbon cycle including feedback mechanisms; regional detailing in projected climate change projections; Assessing and predicting response of ecological, social and economic systems. (IPCC 2001b)

All in all there are plenty off reasons to start mitigating right now – and uncertainty is one of them. Uncertainty cuts both ways. It is possible that the impacts of climate change will be less severe than those projected by the IPCC. However, they can also be worse. This in tandem with indication that the more we learn about climate change the greater its impacts tend to assume (compare the IPCC 2001a TAR prediction of 1.4-5.8 ° C warming to the 1995 SAR prediction of about 1.0-3.5 ° C) and some non-linear events might work much like switches then dials perhaps causing unprecedented impacts (such as the collapse of the gulf stream) and that “studies examined in the TAR suggest substantial opportunities for lowering mitigation costs” (IPCC 2001b p 24) suggest that action is taken best now and climate change is too be taken seriously. Following this reducing emissions of greenhouse gases to stabilize their atmospheric concentrations sooner would delay and reduce damages caused by climate change. (IPCC 2001b)

Part IV Rational of the Mass Media

The rational of the Mass Media

The mass media encompasses a wide variety of information sources ranging radio to print to the internet, serving soaps to documentaries to news bulletins. This paper will confine its discussion of the mass media to “the spreading of information with the intention of communicating issues of relevance to the public” i.e. news outlets specifically with a focus on newspapers. Further this debate of the mass media as far as possible limit itself to problems of communicating sustainable development information.

As individuals, we know little of our world from personal experience: most of what we “know” – even if we think we “know it objectively” – is based on what epistemologists call testimonial knowledge (Greco and Sosa 1999). As such the media has a huge responsibility. In essence it represents our window to the outside world. Accordingly most of the public would confess to the view that we keep up with the news “to find out what is happening in the world”. The newspapers especially are well equipped to serve this role, since they are readily available and can carry much more information than most other media. An averaged educated reader is capable of more than 500 words per minute, this would after 15 minutes reading assimilated about 8000 words, compare this to the average 3 spoken words per second of most radio or TV news broadcast which is only capable of conveying roughly 3000 words. This is simple comparison ignores the fact that the newspaper is interactive, unlike for example radio the newspapers audience can skip sections that they already know or find irrelevant.

The mass media works in what can be referred to as plenary mode, as such it can never convey all the views which are clustered among its audience the public. Its function is to broadcast/report/publish a small fraction of all that could be recorded among its audience, and to highlight it in whatever compressed and simplified form for current attention. In order to do this effectively the media has to be able to market its messages, in essence preserve the attention of its audience. It must speak the audience’s language. It has to communicate.

Thus the newspaper being product of our culture that draws upon traditional experiences of producing stories that bring together conflict, drama, personality and events. Journalists and editors know what they want from “news”, yet struggle to tell some of the most important stories about the ways in which human activity is proving a hazard to the global environment. There is a gap between the readers expectations and deliverance as the news media does not quite report what is happening in the world, but rather concentrates on whatever topics happen to be on top of its narrow and subjective list of events and new to the editor of the day. Indeed it is in many ways not ideal for Habermas (1999) vision of free and rational-critical communication as there are many problems with the mass media of today.

As noted earlier global environment change issues are huge challenges for politicians and policy makers at all levels of government world wide. They require improved level of cooperation between all stakeholders. Environmental change indented to combat global environmental deterioration will reach far into the economic, social and political life of all human societies. The necessary changes require an informed and supportive public. Yet the global challenge has not permeated the man on the street, and remains a mystery. The concept of sustainable development, that underpins response to global environmental change, is tragically not well understood by most people.

The science of global environmental change and sustainability has been badly served by the media. As the science of climate change has matured, media coverage of these issues has not. However the bland assumption by NGO’s, politicians and the public that “the media are to blame” is not sufficient to explain why this has happened. For a more enlightened explanation one must consider the context of the environment the media operates within and the constraints this can incur upon media reporting.

The problems the mass media suffers off can be for structure divided into some topics that will be dealt with each in turn.

- ◇ Process versus Event
- ◇ Economics, costs and profits and the marketplace
- ◇ News values
- ◇ Time and space constraints
- ◇ Complexity of environmental issues
- ◇ Gatekeepers with similar backgrounds

However it must be kept in mind that these topics interact and overlap in complex fashion as noted by Miller et al (in Scanlon et al 1999).

Process versus Event and long term change

An interesting example of values of the news organizations was the outcome of a questioner where senior news management (news executives and senior editors from the BBC) was brought together with academics and policy makers in the field of sustainability. The quiz was constructed to establish how journalists and outside experts assess the newsworthiness of several issues. A list of headlines was prepared and the participants were asked to rate them with marks from one to ten for newsworthiness. The quiz had been constructed with pairs of headlines that would allow for examining the same issue from different perspectives. Further it was conducted at a fast pace to generate gut decisions, and not allow the participants to devise “the right” answers. (Scanlon et al 1999)

One of the more illuminating headline pairs concerned the fires that raged two of the great rainforests in 1997. Two headlines were offered “smoke haze envelops South-East Asia” and “Brazilian Amazon Burns Again”. Both journalists and academics scored the Indonesian fires seven out of ten. But the journalists awarded the Brazilian fires four out of ten, while the experts scored them eight out of ten. This wide inconsistency between the journalists and academia deserves some exploration.

Indeed the BBC journalists represented the values of the wider media. The Indonesian fires were a breaking story that was given a lot of media space; it was a cataclysmic environmental story. Choking pillars of smoke drifted across six neighboring countries bringing business to halt and straining diplomatic relations as millions fell ill in respiratory diseases. Wildlife was devastated as 17000 square kilometers of forests, containing some of the world’s most diverse wildlife, was burned to the ground.

The contrast the fires of Brazil, where burning has till today devastated 20000 square kilometers of Amazonian rainforest, which also contains some of the worlds most diverse wildlife. However, these fires did not receive as much media attention or space. Even though, they arguably pose a greater threat to the global environment through the adding of more carbon dioxide to the atmosphere and a 3000 square kilometers larger reduction of carbon absorbing forest structure. Also the continuous year-on-year burning should worry us more from a sustainable development perspective then the sudden outbreak in Indonesia where the soil conditions are better for re-growth.

But from the journalistic perspective the Indonesian story was much stronger. The Indonesian fires affected many other countries, and as the fires spread to Kuala Lumpur high quality dramatic photo age were available of the health and economic impacts. (Van Ginneken 1998)

Other factors were accessibility and cost. (Blumler and Gurevitch 1995) Most major news agencies could quickly and cheaply fly their far-eastern correspondents to Kuala Lumpur. TV crews could transmit pictures the same day a prove value for money for news editors. It would have cost substantially more to cover the Brazilian fires in the same way. Later the Indonesian fires would allow further follow-up stories of how the major economic boom region of the 90’s capacity to handle the “setback”.

However, arguably, the most significant reason for the Amazonian fires receiving less coverage could be that it is not new. The Brazilian fires have been raging for the last 20 years and as such news editors consider it to be old news. An uncomfortable paradox is presented; the longer environmental problems

persist the less attention they hold with the media (unless political agenda or editorial prejudice continually forces them onto medias agenda, such as the case of crime rates). In a way the media only works like the humans that create it. The eyesight of most predators, and indeed humans, is keyed more on movement than stasis. For example, out of the corner of our eye we catch a fly on the ceiling even though we have not consciously taken in the entire foreground, this is an evolutionary adoption. Newspapers are like this. The media respond to breaking news, to new things, to change. For example, when was AIDS last mentioned at any scale in newspapers? Not recently, however, this is not to say that the epidemic is under any control or in recess, to the contrary HIV is a problem that is growing everyday. But in the news media it is like a koala that has adapted to predation by moving slowly, thus it is yesterday's news. It is not the fault of the media per se; it is inherent in our behavior, its audience and creators, to whom it must communicate.

This short-term focus has uncomfortable consequences when considering environmental issues. In for example transport issues this becomes apparent, rail safety has improved dramatically over the last century and rail accidents that were commonplace at the turn of the century have become very uncommon. Because of this it is fabulous news, most rail accidents acquire lots of media space and follow a set scheme of reporting events. First there is an initial report with preliminary casualties and injuries; this report usually becomes the lead story and front page if good photo age is available. Thereafter follow up reports from survivors feature in tandem with reports from whatever committee has been designated to investigate who's to blame. Once a scapegoat has been appointed the story usually dies out for a year or so. Where after follow-ups on how rail safety has or hasn't improved remind people about last years tragedy. Now this might be well since the train crash arguably reveals a risk to human life that should be communicated. However this approach takes no account for the possible consequences this kind of short-term focus can have, due to medias influence over the public similar short-term thinking can be developed among the public. In the case above it can be perversely argued that this kind of reporting actually increases risks for the public. In Britain most of the increased safety measures introduced, many of which have been introduced in response to vicious media campaigns, have been financed through increased ticket prices. Rail fares have soared above the price of car travel, which has lead to greater car use where the emissions into the atmosphere are higher and risks of injury are much higher. Add to this that media actively underplays the risks of car travel, where people die every day. But since this is a continuous process as opposed to an event it becomes inherently un-newsworthy. (Scanlon et al 1999)

Economics, costs and profits and the marketplace

At a time when the corporisation of the media all over the world has turned news into a marketable commodity, multinational corporations in tandem with media conglomerate especially in the US have formed. Even though the conglomerates may have different names and external appearances, they all operate within the same highly competitive marketplace where they fight for survival and, if possible, share the same goal of profit maximization. Along this line of reasoning it can be argued that the media conglomerates interests can be reflected in reporting at each individual new agency. Perhaps the slump in media interest in environmental issues after the 1992 Rio conference on sustainable development can in part be attributed to the media conglomerates noticing a slump in their Wall Street accounts. (Blumler and Gurevitch 1995) But more convincingly is an example noted by Jap Van Ginneken (1998), when tobacco advertisement was banned from TV in 1970 in the US huge advertising budgets were shifted towards printed media. Even though the link between cancer and tobacco smoking was well established script-writers were ordered to always associate cigarette smoking with heroes and pleasure and never with illness and victims. This resulted in magazines that accepted cigarette advertisements to sway away from reporting this hazard. Indeed a study conducted by R.C. Smith in 1978 (in Van Ginneken (1998) concludes that in magazines that accepted tobacco advertisements over several years not a single article was published that would allow readers to understand the danger of cigarette smoking.

Even though the more informed editors would like to promote environmental stories they are inevitably faced with the fact that the costs of reporting sustainable development issues can be high. The sharpest focus of sustainable development debate is often in more remote locations, such as offshore oil platforms or developing countries, where disparities in wealth and health are extreme and fragile environments are being destroyed through pressures of business, poverty, population growth or a combination of them all. But travelling to these remote areas costs large sums of money, including both external and internal travel

and the reporters travelling time wage. Editors keen to report on sustainable development issues can be reluctant to dedicate the amount of monetary resources it requires since the costs for a European based news agency for two reports from Madagascar come at the expense of say five reports from America. It is a simple though regrettable fact of journalistic economy that the farther from a major international centre an event takes place, the less likely it is to be covered. (Van Ginneken 1999)

Time limits are linked to the economy and are another important factor which exaggerate the problems of complexity. Journalistic research time costs editors money and as such tight limits are put on this expense. The more angles a journalist explores on a story the more time is consumed. When journalists are under pressure to publish or broadcast, and many news media are cutting costs by reducing staff, this becomes a problem.

Also journalists face a difficult challenge when it comes to the shift towards increasing market forces in the funding of scientific research. Finding funding in the marketplace is now a larger preoccupation for most scientists than in the time when long term government funding provided a more secure base for research. This has in turn encouraged some scientists to leap into the media with controversial hypotheses or premature findings that are deemed sexy in order to secure grants or at least create some media space for the individual scientist or institution. Being famous and funded can be better for the individual scientist than poor and cautious. Having famous scientists could raise awareness and interest for science. However, this trend has a more serious drawback in that it creates problems for journalists wanting to evaluate the credibility of reports or scientists claims. There are two races occurring simultaneously, first the scientists competing to claim media space for his discoveries and second the battle of news agencies, no one wants to be the last to report news.

News values

As mentioned earlier there has been a considerable amount of work on news values. Despite this there is as of yet no complete conformity on categories and terminology. A few concepts of importance to sustainable development will be considered here. (Galtung and Ruge 1965, UNESCO 1975, Mencher 1977, Bell 1991 and Lundgren et al 1999).

As before

Universal independent factors

- ◇ Frequency: How well a story fits with daily news cycles
- ◇ Timeliness/Topicality: The way an item is close in time, place or both
- ◇ Unambiguity: Issues should be clear cut and contain few uncertainties
- ◇ Meaningfulness/Relevance: Cultural proximity, or how much people care about certain issues
- ◇ Unexpectedness: Degree of surprise
- ◇ Threshold: The level at which a story can become news, eg numbers killed etc
- ◇ Continuity/Currency: Events and situations that are being talked about, news creates news
- ◇ Cooption: Similar stories follow successful ones
- ◇ Competition: Is the story exclusive
- ◇ Composition: Balance between social affairs, foreign, crime, politics etc.
- ◇ Consonance: How well a story fits with news producers preconceptions
- ◇ Predictability: Extend to which events are scheduled by PR operatives
- ◇ Conflict/Controversy: Events should reflect drama or conflict between individuals or institutions

Culturally dependant factors

- ◇ Elite ness/Personification/Personalisation (Nations, Persons, Sources): Nature is an elite source, The US president is the most elite person in the US etc.
- ◇ Facticity: Number of facts in a story
- ◇ Negativity: The best news are bad news

Source (Galtung and Ruge 1965, UNESCO 1975, Mencher 1977, Bell 1991 and Lundgren et al 1999)

Undoubtedly one of the most difficult problems of journalists wanting to report most sustainable development stories will face is that of “event versus process”. However, some news values are less tangible than the event-process problem and deserve some explanation.

Consonance is a complex news value that can be exaggerated by space constraints. This becomes especially true if issues are polarised and treated dualistically, in the black and white or good versus evil style. Consonance prefers stories to fit pre-existing models and tends to filter out deviance. Thus consonance helps to communicate stories to the public in the prefabricated nondeviant mode, since no framework is needed; it is already supplied, rather like a TV game show. Problems arise since known and accepted formats put reflexive questioning of their own nature of limits. As such, the questioning which is inherent in most science, the questioning of its own “facts” becomes not newsworthy. It is like raising the question “why play the piano and not tennis” the format can not handle it. Thus consonance conspires with conflict to exclude complex and process oriented sustainable development stories.

Personalisation and personification has been a normal part of story telling since ancient Greece. Interest in prominence and elite people is part of “the social structure of attention”, add to this that trustworthy sources of authority that reinforce the “dominant world picture” is something that most governments strive to establish (Fallows 1996) then the situation can become problematic. When for instance the interest in prominent people becomes the overriding news value, as in the tabloid news, or when it becomes an excuse to not look for the causative sources of problems. Having authorities sources can save a lot of time and avoids extra levels of fact-checking for hard pressed journalists. However, relying exclusively on these sources, which are nearly always representative of governments or powerful institutions fails to explore stories for deeper messages and prejudices.

Timeliness or topicality is another dilemma which is related to the event process problem. News explains the events of the day selected by editors (whose choices can be influenced by personal preference) and examines their short-term consequences. It is extremely difficult engage the media in discussion on events that may or may not happen in 100 years time. So the idea that the earth will warm with potentially catastrophic consequences over the next century is, although massively important, difficult to convey and something we have heard before. Therefore the discussion in the media tends to focus on the drama behind climate science. It is conveyed through individual events in the natural world which appear to confirm or deny the global warming theory such as, can malaria mosquitoes move north and cause epidemics or the coral reefs being badly bleached by surges in global temperatures. Due the nature of topicality these narrowly focused reports are far too often presented as bald statements of natural fact and too seldom attempt to place the issues within the broader debate of if and how global warming is caused by humans.

Unambiguity is one of the more subtle but still problematic issues when it comes to medias coverage of sustainable development issues. The problem arises from sustainable development issues are far from “clear cut” and contain allot of “if’s” and “but’s”. The discussion becomes complex, dynamic and requires a sophisticated understanding of science. This problem can often be alleviated by a better scientific understanding from journalists, as specialist environmental correspondents often elevate environmental coverage and are more capable of maintaining complex discussions while still communicating to the lay audience. But skilled scientific correspondents are rare in an arena that traditionally has employed exclusively social scientists. Also better communication between scientific institutions and media institutions, could make a big difference. (Jürgens 2001) Perhaps scientific training should include not merely how to communicate between peers but also how to communicate to the public sphere.

Time and space constraints

How long much media space a topic can acquire (columns, item length or word limit etc) and how much research time the journalists are allowed are interlinked key factors that determine what kind of items can be published and how they will be received. Space and time available are often facts that limit journalist’s ability to tackle complexity.

Space is often precious in many news and current affairs media. The more extreme examples include morning broadcast news bulletins on radio and TV where as much information as possible is transferred in under an hour. Where reporters are often not allowed more than one minute to tell their stories. At an

average of three spoken words per second, that means the story must be told in under 200 words, relating all the relevant facts and being told in an accessible fashion that can engage the audience as they are driving to work or sorting out the children's lunch arrangements. Even in newspapers, space is uncomfortably tight, especially as they tend to dedicate a lot of space to whatever big stories are in the news at the time, often robbing other important issues of space. As such news and environmental news in particular is often a painful compromise in which the journalist knows that he or she is oversimplifying the picture.

Following Etzioni (1993) suggestion that "quality time" only comes out of "quantity time" i.e. time spent researching is proportional to quality of product. Indeed it has long been accepted by media scholars (Fallows 1996, Chomsky and Herman 1988) that the more stories are compressed to fit a stringent space criteria the more difficult it becomes to say something new. This in turn increasingly reinforces the "known" accepted dogma or "common sense" view, rather than exploring the "knowable".

An example of this was apparent in a BBC TV news report that examined the Exxon Valdez-Prince William sound disaster ten years earlier. The reporter concluded by repeating the misleading simplification that the disaster was the fault of a drunken captain Joseph Hazelwood and thus it was "the worst drunk driving incident in history". No attempt was made to examine the institutional and structural reasons and background behind the story nor to mention that Exxon has strenuously avoided to pay its five billion dollar fine. Doing this would have inevitably explored a deregulated, globalised, hypercompetitive shipping industry that disregards the safety of crew and ship in order to drive down costs and increase profits (Hanningan 1995).

Complexity of environmental issues

The problem of the long time scales involved in many global environmental change stories are further challenged by the difficulties of reporting complex issues. Whatever the aspirations towards a dispassionate analytical journalism, it is still the case that stories make a more powerful impact if they have a simple and clear moral message. Therefore stories tend to be reported as polarised, in black and white. This becomes difficult when applied to sustainable development stories since they tend to come out in shades of grey and not very often black or white. The debate on oil pricing is a good example: the media often focuses on two party conflicts such as, poor consumer and governmental taxes or birds and emissions when the real balanced conflict involves all four aspects.

Sometimes journalists can seek conflict by characterising the extreme positions of debate on any given subject such as NGO versus multinational cooperation's. This is not just unhelpful for progression by consensus, but also has a distorting effect of the portrayal of the debate itself.

Since readers are engaged if there are elements of dipole or evil versus good. Stories which lack this can often puzzle the public, as was the case of a BBC documentary on the impact of large dams in India. The story was complex and conclusions ambivalent. While many people in some areas had lost their homes, and the dams and irrigation systems were poorly maintained. Other areas were more successful with fewer people moving out and properly maintained dams had irrigation systems that had led to increased agriculture production and cheap non-polluting electricity. Although this case does not seem too complex it failed to give a clear answer to "should we be for or against dam construction", which is a valid question likely to be asked by many who expect the media to educate them. (Van Ginneken 1999, Habermas 1989) Even within the BBC the programme most likely evoked mixed feelings, since the documentaries that win the most awards and attract the largest audiences are often the most predisposed and the BBC editors are similar to all editors under the pressure of audience figures.

Gatekeepers with similar backgrounds

Environmental issues are new for most editors who act as gatekeepers ie dictate to a large extent what gets space and what does not. The gatekeepers have typically received their journalistic training from veterans usually accomplished in making decisions on the news value of stories in traditional fields of journalism such as crime, politics, foreign affair etc. Decision making on environmental issues is often deemed problematic and erratic, since many of the stories on the sustainable development agenda are

completely new and have little journalistic precedence. Many editors fear the scorn of their colleagues and are reluctant to give space to new issues without it having been verified as a valid news story by preferably another news outlet. (Burke and Briggs 2002)

It has long been argued that elite or establishment views dominate serious journalism in many countries especially in the UK and USA. While most national broadsheets upper management do not consist of chiefly Eton graduates as was the case a few decades ago, there is still an large influence from the amount of Oxford/Harvard graduates. Most of who have studied humanities and social sciences, specifically economics or politics. Hand in hand with this comes a strong bias towards establishment views in the sources that are routinely used for instance; The Lancet, The Economist, Nature and Science. (Burke and Briggs 2002)

Cross-sectoral issues like sustainability become difficult to manage for news organisations which are structured into separate specialises reporting on different areas of interest traditionally governed by a social science perspective. News organisations will often have separate specialist's correspondents on economics, environment, transport, health, politics etc. The sustainable development agenda as defined by the Rio Earth Summit of 1992 encompasses all these and more issues. Despite this stories that concern more than one area of interest often fall between gaps in journalistic specialisms. Environmental economics for example, have not yet been taken seriously by most mainstream economical correspondents. Similarly the environmental aspects of transport were long ignored by transport correspondents and once they were brought up into the air a lot of fruitful media discussions that would involve adding more disciplines were left unexplored. Such as equity aspects, for example, in a society where you have a large portion of citizens who are car-less, should richer car-drivers from the suburbs have the absolute right to pass through areas where the poorer car-less live and impose the associated noise pollution and accident risks?

The set "news line" is another complexity associated with most gatekeepers sharing educational background, i.e. the way any one story is being told, the angle taken on a story, these can range from "ministers visit global environmental conference" to "ministers out on luxury trip to Rio". Once the "news line" has been set, it can be difficult for individual journalists to take an independent view. Because gatekeepers despite the ambition of promoting editorial independence, have an opposition towards being on the wrong track.

Also global issues tend to fall between chairs. It is often unclear where the responsibility to report on third world debt lies within established news organizations – it tends to fall between the religious and economical correspondents duties.

PART V Case Study

Case Study

Over the past fifteen years climate change science has undergone substantial evolution and maturation. Since the time of suspected temperature increase not directly attributed to human influence to today's sophisticated understanding presented in this papers earlier section.

The media has a monumental role to play, since it to a large extent governs how people perceive climate change and thus what choices they make related to controlling it. In the ideal scenario, the media would communicate precisely with a free rational debate (Habermas 1989) giving the audience reliable and accurate information about the opportunities and constraints climate change incurs. However, the media as accounted for in the previous chapter has had notorious difficulties in communicating science to the public, let alone science within the reasoning of sustainable development.

A survey intended to examine if the mass media has managed to communicate the changes inherent with modern climatology and if the concept of sustainability has been captured in this communication was set up.

Methods

For the purpose of this study the contents of the two geographically distinct newspapers were scan read for articles relating to the process of climate change. The scan reading would take place in the relevant library using the uniform equipment, negative film reader and copy machine, found in each library with the exception of issues LT (2002) September 10th to 18th which was only available in printed paper format at Linköpings Universitets bibliotek. Articles containing reference in at least a complete sentence to the process of "greenhouse effect or gas", "climate change" or "global warming" were selected for this study that is to say; "Bush signs climate change treaty" would not be included since it is a mere reference to a treaty named after climate change, but, "greenhouse gases cause climate change, therefore bush signs climate change treaty" would be included. The placement of each article relative to other articles found on the same page was noted for later reference.

Since "it is possible to carry out investigations combining positivism and hermeneutics" (Thuren 1991 p 90) both a quantitative and a qualitative investigation will be carried out.

The quantitative method was carried out by placing each article along side a sheet with eleven boxes organized into 5 pairs and one stand alone. No more than a maximum of ten minutes (for 2000 word and above articles, five minutes for others) was spent on each article for this part of the study as it was deemed the gut feeling of the potential reader was to be captured in the quantitative analysis. Thereafter the boxes checked with one check on each pair. The paired boxes include;

- ◇ Agrees/Disagrees with Climate change, this box aimed to test for if the article gave the impression underplaying climate change. If there was a bias in argumentation for climate change not being anything to worry about then the disagrees box was checked.
- ◇ Advanced/Simple debate, this box aimed to test for what level of complexity the article allowed. In order inspect the complexity allowed with regards to climate change science and sustainability it would be interesting to examine how well the media has cooped with the two most basic ideas of climate change.
 1. The build up of greenhouse gases is causing the earth's mean surface temperature to warm "*Continued accumulation of greenhouse gases in the atmosphere would lead to climate change whose rate and magnitude were likely to have important impacts on natural and human systems (IPCC 1990)*" (IPCC 1995 p 12)
 2. The human attribution as the SAR states "*The balance of evidence suggests a discernable human influence on climate over the last 50 years*" (IPCC 1995 p 4)

Thus the criteria for a complex article were; naming a greenhouse gas, a mentioning of sustainable development or some thoughts derived from it (i.e. some wider scope of impacts implications) and

if the article dated 2002 the additional requirement of linking climate change or emissions to human activities was necessary.

- ◇ Space large/small, this box aimed to test for news value by dividing articles into over 500 words (large/high news value) or below (small/low news value)
- ◇ Important/Not important, again this box aimed to test for news value but in a different way. Since we read from top to bottom and from left to right, news editors place news articles accordingly, more important ones top left, least important ones bottom right. The criteria for an important article would be one of the following; front page position, upper left corner position of any page, upper half of page with associated picture or lead article. (Lindqvist 1985)
- ◇ Process/Event this box aimed to test if an article was engaged in discussing the process of climate change or if the article was covering climate change because of an overriding event that required a mention of climate change
- ◇ Main topic; lastly a single box was to be checked if the article devoted more than 1/3 of its space to the climate change discussion. Or if it was the focus of something else with a brief side step into climate change issues. Such as an article on how rodents affect bird populations with minor reference to climate change.

The ideal article would score as many of the following as possible; Agrees with Climate change, Advanced debate, Space large, Important, Process and main topic. (Stone and Boudreau 1995)

For the qualitative investigation Dahlgrens “interpretation loop” (in Jarlbro 2000) was used on some select articles, two low scorers and two high scorers from each time set and newspaper. The “interpretation loop” is a set of six questions which one asks the selected texts in a non-linear fashion. Any one question can be returned to at any one time and serves to further enlightenment of the texts relevance and connotation, the six steps are;

- ◇ Media framework
- ◇ Texts intentions
- ◇ What audience is intended
- ◇ Production circumstances
- ◇ Texts construction
- ◇ Social/Societal circumstances

(Authors translation Dahlgren in Jarlbro 2000)

Limits of study

The mass media represents our window to the world (Van Giniken 1998, Scanon et al 1999, Greco and Sosa 1999). It represents an important source of this information; as such it has an important role in a free rational-critique communication of science to policy makers and the public. (Habermas 1989) Today the term “mass media” includes everything from news papers and television, all the way through magazines and films/video to digital broadcasting of various forms. This communication takes place through various genres that include but not restricted to; specialist TV programs, science fiction, magazines for lay and specialist audiences and general news coverage.

As diverse as the mass media, or arguably even more so, is its audience ranging from university educated white collar high income workers to blue collar lower income workers. Since the mass media must appeal and communicate to its audience the message it transmits will also vary across diverse mass media targeting different audiences. So some narrowing of scope is needed in order to proceed, but in narrowing the scope of the study it becomes limited in the sense that it omits parts of the big picture of the mass media. Some prudent choices are needed.

It is this later genre of general news coverage found in daily newspapers that this paper will focus upon and limit its debate too. The reasoning behind limiting the study to newspapers has been that newspapers are excellent for representing the end product of the news value process (Hvitfeldt 1985) were other media are methodically more demanding to analyze. Broadsheets are also more accessible and allows for faster scrutinizing, thus given time and budgetary constraints printed media were the only feasible. Since

Western Europe, USA, Japan and the former Soviet Union remain undisputed as the largest contributors to climate change, (Miller 2002) a focus on these was deemed to yield the most relevant results. Due to language barriers Japan and the former Soviet Union were excluded. Further news papers generally have a target audience or readership that to a greater extent than other media consists of the affluent and educated, since the likelihood of someone being a regular reader of a newspaper increases with age, education and income (Ebesco 1997). To further polarize this for an as positive outcome as possible two broadsheets targeting the upper end of the news market were chosen for this study, The New York Times, New York, USA (NYT) and The Times, London, UK (LT). It is suggested through their greater income the readers of these newspapers are more likely to consume more products and services, thus deemed apt to contribute more than those of lower income to global emissions. Further it is assumed through their higher levels of education this group is likelier to be able to accurately assimilate a rationally argued debate on climate change and therefore it is more likely that this debate will be present in these broadsheets. Indeed the target groups of both the newspapers selected for this study represent an ideal target group for climate change discourse. If one can not be successful here it is unlikely that this debate will achieve anything somewhere else.

The chosen newspapers have some common demeanors making them comparable

- ◇ National spread with headquarters in major international port
- ◇ Significant actor on the news scene of each country with associated budgets and outreach
- ◇ Self-proclaimed politically independent outlook
- ◇ Up market news agency with ambition of being recognized as a source of reliable information
- ◇ Public records accessible from Sweden or neighboring countries (Denmark)

Since examination of every article published from 1992 to 2002 would have been extremely time consuming the news analysis was limited to two sets of five week intervals for both examined newspapers one set from the year 1992 and one set from 2002. The five week period was deemed to provide enough material for analysis, since it was expected to accommodate the periods of the debate of climate change moving in and out of the media, and at the same time a manageable amount of material given resource constraints. To avoid difficulties drawing general conclusions the studied weeks were equally distributed around the two dates of equal international news value. The UN earth summit events, Rio de Janeiro 1992 (5/21/92 - 6/27/92) and Johannesburg 2002 (8/12/02 - 9/18/02) would prove prime candidates making comparisons over time and regions possible. However, in choosing two events as study periods the process-event part of this investigation becomes more unreliable. It would have been served better by examining for example, an event such as the UN conferences against a random non event date such as a set of five weeks in 1993. Alas doing this would most likely have compromised the quantity of utilizable articles (perhaps even leaving the author with none for the 1993 set) which in turn could compromise quality of analysis, further the comparability between other factors over time would have been more contestable.

All additional sections apart from the weekday news sections and science (if there was such) were excluded such as weekend, metro, sports etc.

For the LT (2002) 10th to 18th September issues it is possible that some random pages and sections were missing due to theft, although it is difficult to establish what impact this might have on the study at hand.

Results Quantitative study

A total of 59 articles were found for the 1992 period and they were distributed as expected with a build up just before, some peaks during and a period of low interest after the 1992 earth summit as described by chart (1 and 2) with LT (1992) having 31 articles and NYT (1992) 28 articles respectively.

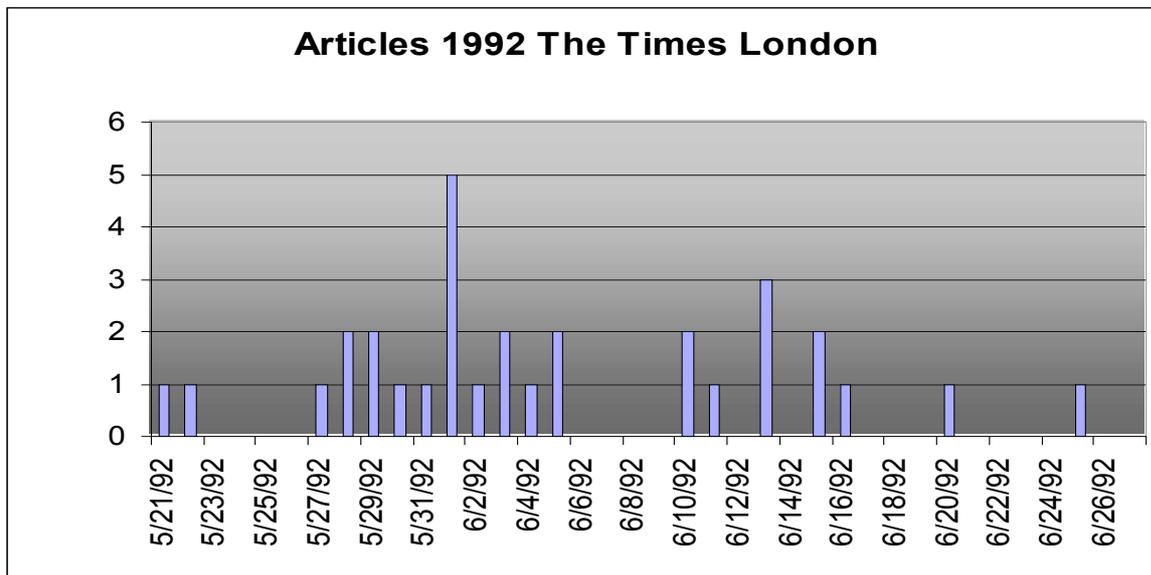


Chart 1 above

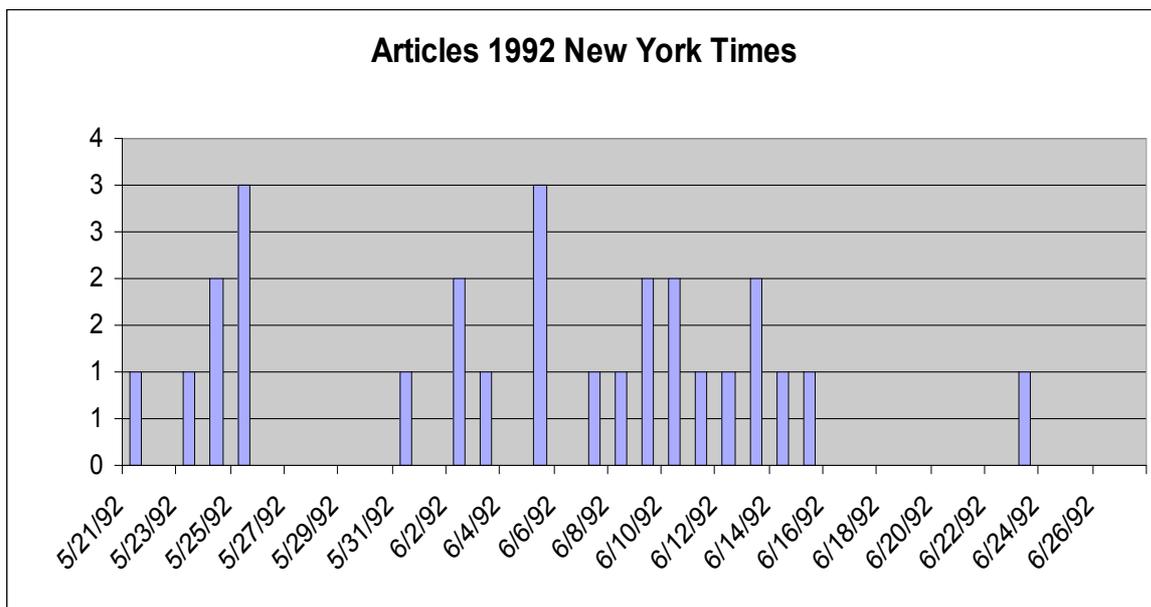


Chart 2 above

There is little regional difference in amount of articles published as shown by chart 3, with the exception of an extra science section in LT (1992) two days before the 1992 conference which scores five articles.

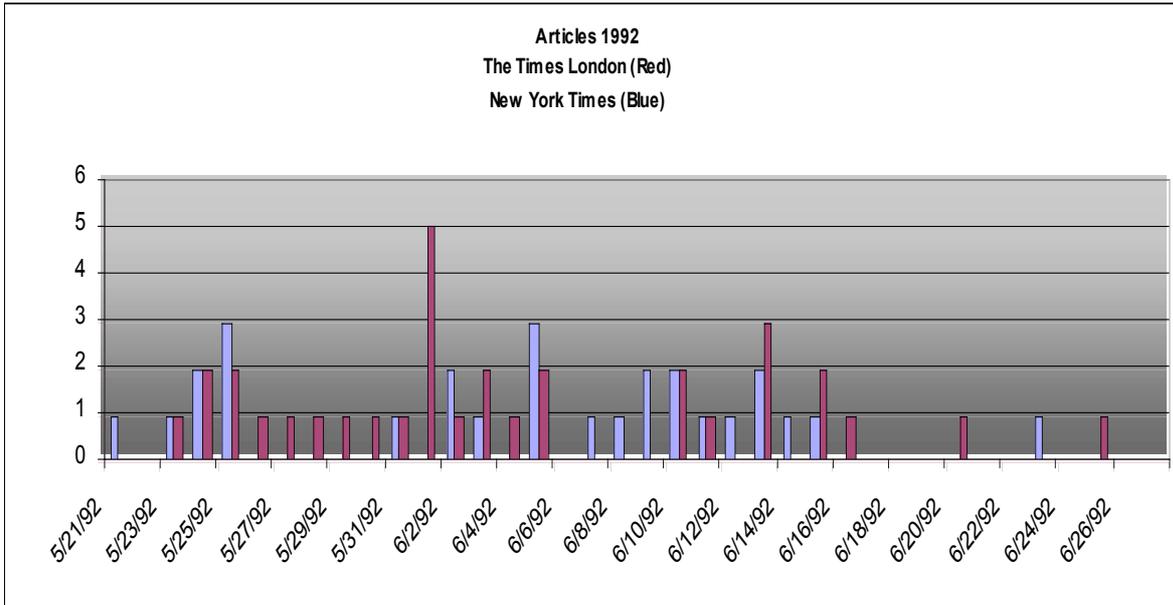


Chart 3 above

A total of 73 articles were found for the 2002 period they were also distributed as expected with a build up just before, some peaks during and a period of low interest after the 1992 earth summit as described by chart (4 and 5) with LT (2002) having 37 articles and NYT (2002) 36 articles respectively.

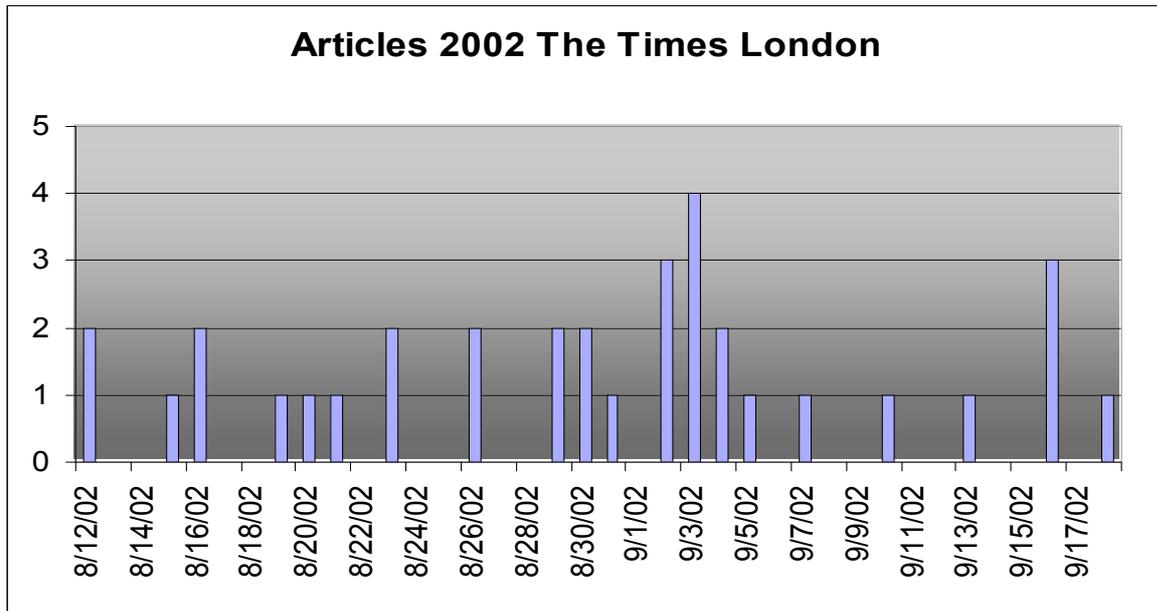


Chart 4 above

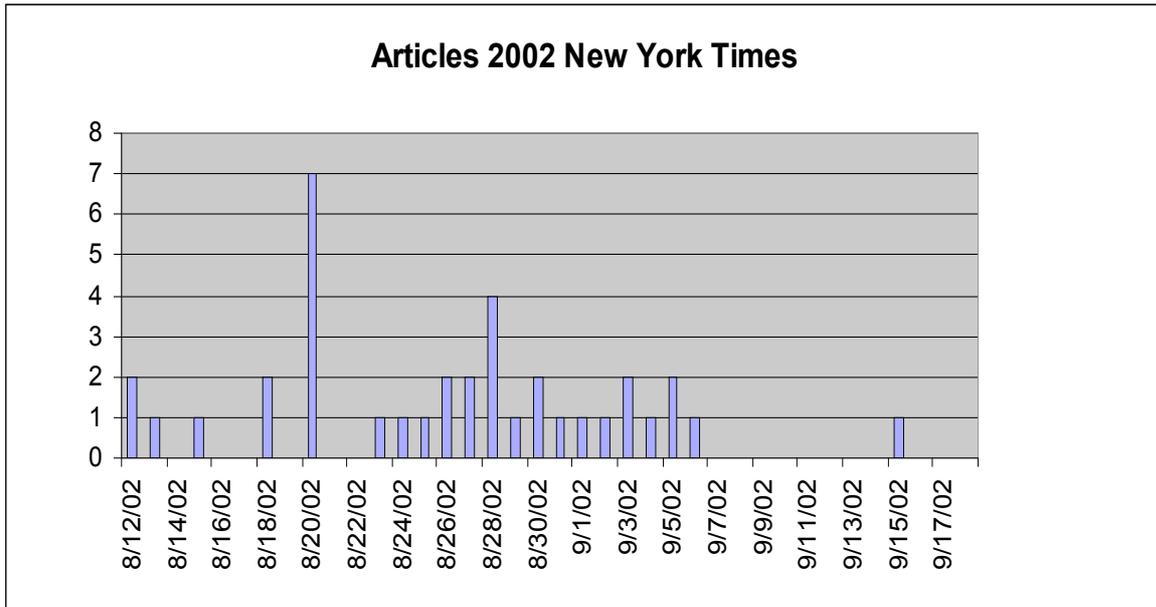


Chart 5 above

Again there is no real significant regional difference in amount of articles as shown by chart 6

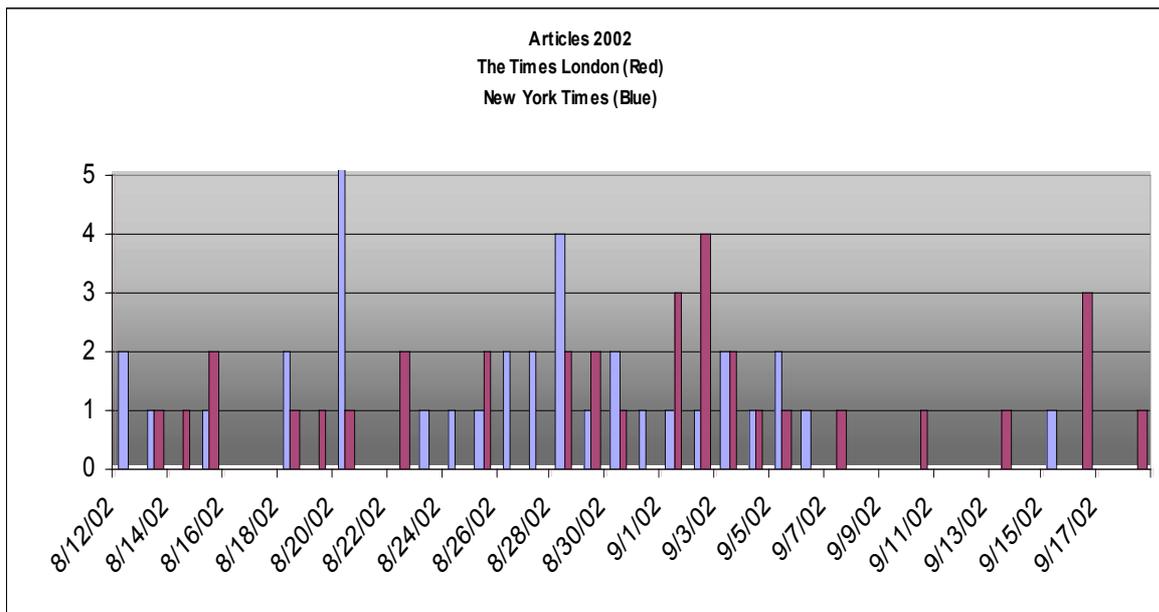


Chart 6 above

However, it is first when we line the different factors up in table 1 that we can see some interesting trends

Table 1	Articles	Agrees	Disagrees	Advanced	Simple	Space large
---------	----------	--------	-----------	----------	--------	-------------

LT(1992)	31	29	2	13	18	13
NYT(1992)	28	25	2	15	13	21
LT(2002)	36	30	5	9	27	15
NYT(2002)	37	34	2	15	21	24

Space small	Important	Not important	Process	Event	Main topic
18	17	14	6	25	13
7	19	9	8	20	16
20	20	16	8	27	24
13	26	11	10	27	14

First of all coming from left to right, top to bottom in table 1;

- ◇ Very few articles disagree with the notion of climate change (and those that did will be covered in the qualitative part).
- ◇ The simple articles always outnumber the advanced ones and the fraction of simple to advanced grows over time, as assumed.
- ◇ It seems they climate change articles have started to take up more space overall, which is true. However, closer examination reveals the trend to be large space, simple, important as the common demeanor. With Advanced articles becoming small size and more importantly Not important.
- ◇ All newspapers studied have devoted more space to and time (number of articles published) to reporting climate change, sadly the quota of process oriented articles has gone down as the number of process oriented articles have remained basically the same. This is most evident for the New York Times
- ◇ Considering the criteria for an ideal article were not that high and that both study periods were in an optimum news value period, it is surprising to find only one from LT (2002) (8-16-02) and two from LT(1992) (30/31-5-92) similarly NYT (2002) and NYT (1992) both have two each (08-26-02 and 08-18-02) and (5-31-92 and 5-25-92) respectively. However, NYT (2002) 08-26-02 argues (and does this very well) against climate change being anything to be concerned about. Thus one can argue that within the limitations of this study the trend from 1992 to 2002 is of less quality to the reader seeking information on climate change. The rest of the articles that have the most important qualitative factors of advanced and process oriented discussions are often small and sporadically placed.

Qualitative study

The qualitative study was of limited value as the author is a trained biologist and as such not well versed in politics and international affairs.

However examining the language used certain interesting regional differences appear. The LT (1992, 2002) uses more hard terms like “carbon dioxide causing the greenhouse effect” (LT 1992-03-06) and moves on to an overall more advanced debate in the 21st century. NYT (1992, 2002) is more cautious in it’s approach using softer language like “scientists believe” or “can be linked to” (NYT 1992-05-06, 1992-09-06). The British newspaper further has a more debatable climate in it’s editorials. As illustrated by an editorial written by the famous Danish statistician Dr. Bjorn Lomborg (LT 08-30-2002) who has been dubbed anti-environmentalist by many scholars. Lomborg coined this phrase in his book with regard to the state of the environment;

“I can not exclude with certainty that the plane I'm about to board will crash, therefore I will assume it will crash, therefore I will not board.”

However, in making the case for a more rational and scientific debate on environmental issues and arguing cost/benefit research Lomborg has an important point. But, his data is exaggerated, he makes sweeping

generalizations, presents false choices, is highly selective in his use of data and quotations and, frequently, is simply wrong. (Jørgensen 1998)

Nevertheless the debate in the LT engaged a number of scholars who wrote to the editor the following days falsifying Lombergs claims. Indicating more debate than the NYT.

Summary of results

Over the study period not many articles with any substantially informative contents were found for the reader seeking to learn about climate change in a balanced rational debate.

The articles of substance were often small in size and sporadically placed in the newspapers insuring that the reader would not find them with ease.

The articles of substance's message would most likely be warped by the bigger and better placed articles that more often than not underplayed or contained inadequate information regarding climate change.

Despite the criteria for the proposed ideal article were low and the international new scene positive, it yielded poor results and an indication of a declining trend.

Finally the LT seems, to have greater space for a flourishing debate.

Part VI Discussion & Conclusion

Discussion

Knowledge of what is does not open the door directly to what should be.
Albert Einstein (1954)

I remain optimistic about what can be done and pessimistic about what will be done. The gap between “could” and “will” appears to be the result of what Hardin (1999) terms “the ostrich factor”. Thinking such as global warming can be brushed off as “gloom and doom”. This denial has been true from Malthus (1798) to Carson's (1962) on through till the present day.

In this era of economic and technological dominance, the findings of science about global warming and other major environmental issues fall into the category of: “I wouldn't believe it even if it were true.” The present dilemma is that a significant body of scientific evidence indicates that global warming, resulting from anthropogenic greenhouse gases, should be taken seriously but would require a major shift in human behavior to abate and requires substantive changes in both economic and technological practices. As such the denial of the need to reject the dominant paradigms (“All economic growth is good”) requires rejection of current scientific evidence.

There is an alternative, however, which is based on rationality, sustainability and precautionary approach that enables us to make wise judgments even in circumstances of moderate to high uncertainty.

This approach requires a free and open exchange of ideas in an atmosphere of respect. Demonizing those with opposing views impedes a free and open exchange of ideas. Instead we should commemorate the diversity of human natures and the variety of paradigms, because we inhabit a dynamic world where making judgments is a continuing requirement. (Habermas 1979)

Despite the fact that many problems have been identified inherent with media and news production covering complex and process-oriented issues, this should not be seen as a hopeless situation. Rather with the weak points exposed this is exactly where we must reassess medias function in order to achieve good sustainable development coverage. Arguments can be for an increase in resources for serious news, that would mediate the move from sausage-machine news with limited budgets for man hours spend researching issues. Too deeper reporting and free rational discussion. The final question for editors should not be “will this entertain/fly” rather “is this what we need to know”. Seeking and transferring the “knowable” should be the quest of every news writer. Also the knife cuts both ways, and could not be argued the fault of the media and it's circumstances. The media is a product of our society and as such we are all responsible to actively seek communication with it. Indeed scientists could be trained in the art of media communication so as to become more active stakeholders. (Jürgens 2001) Perhaps one way forward are all the MSc. conversion courses for natural scientists to learn journalism at universities around Europe.

However it is most likely that only when the public comes to the realization that serious news is indispensable to conducting current affairs both public and private will there be the growth of audience figures that all news producers are seeking.

Indeed all these are essential conditions for communicating sustainable development issues through the mass media, but at the same time they are also essential components of the mass media conducting business in the public's interest in a democracy.

Conclusion

The question of whether or not climate change is happening and that human consumption is a major driving force is an old one. We have the answer and the answer is tragically yes. The real question is at what rate, and how do we manage it. (IPCC 2001a)

The mass media determines most of what we “know”. Since – even if we think we “know it objectively” – it is based on what epistemologists call testimonial knowledge (Greco and Sosa 1999). In essence it represents our window to the outside world. As such the media has a huge responsibility. Because of their format newspapers are especially capable to serve and excel in this role.

However, the mass media is an organ operating within an environment that doesn’t allow for it to reach its full potential as the vessel for free rational-critique communication. (Habermas 1989) Further the mass media is hindered by competition on a global market that prevents it seeking the “knowable”. Also institutional hindrances remain before the media can facilitate this vision.

As such the mass media fails to communicate science vital to our survival. (Tickell 2002) The case study conducted for the purpose of this paper indicates the trend for communicating climate change science is towards the less informative. However, more research for longer time periods is proposed in this area in order to establish anything substantial.

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