

19<sup>th</sup> and 21<sup>st</sup> Century Brazil: Population growth, urbanisation & pollution in the developing world

*Paul H. Mason*

*Abstract*

This article is in part a photo essay looking at Brazil as a case study of human population growth. A country of stark contrasts between poverty and affluence, beauty and pollution, shantytowns and skyscrapers, Brazil is considered to provide insights into the likely future of urbanisation in other parts of the developing world. In developing countries, the urban population is increasing much faster than in more-developed regions. With the world's total urban population expected to reach 5.1 billion by 2025, what will happen when the consumption patterns of highly urbanised societies become global? How will developed countries take responsibility? With human population soaring, what will our limits be?

Brazil was the site of Charles Darwin's first two landfalls, San Salvador and Rio de Janeiro, on board the Voyage of the Beagle. That landmark adventure into natural history and geology was to be the groundwork of Darwin's pivotal book, *The Origin of Species*, the 150<sup>th</sup> anniversary of which we celebrated last year. The year of Darwin's most famous publication also marked the beginning of a new age in fossil fuel consumption, with the first oil wells being drilled in North America. Augustus Earle and Conrad Martens, two 19<sup>th</sup> century artists who accompanied the Beagle at various stages, have provided us with historical sketches and watercolours that demonstrate striking visual comparisons with present-day photographs. The changes in human terrains over this period can be viewed with respect to population growth, urbanisation and pollution.



**Figures 1 & 2:** 19<sup>th</sup> century sketching by Augustus Earle of San Salvador, Bahia, contrasted with Salvador da Bahia, Brazil, April 2009

In figure 1, we can see the view of Salvador da Bahia that Darwin would have seen in the 19<sup>th</sup> century and in figure 2 the view that we can see today. The fort pictured in the bay (Forte São Marcelo) and the church (Igreja Conceição da Praia) pictured by the beach—but hidden in the photo—are two buildings that still both exist. The Teatro São João pictured in the top right hand corner of Augustus Earle's painting only existed until 1922. It was later replaced by the Palácio das Esportes. The place that Augustus Earle once sat to sketch this city is now home to a shantytown where tourists are warned by locals not to go for fear of armed attack, violence and robbery due to the increased economic pressures of urban poverty.



**Figures 3 & 4:** Conrad Martens' 19<sup>th</sup> century watercolour of Botafogo Bay, contrasted with Botafogo Bay, April 2009

In Rio de Janeiro, the contrasts between what Darwin would have seen and what we see today are vast. The photograph of Botafogo bay taken in 2009 is situated much further from Corcovado Mountain than Martens' 19<sup>th</sup> century painting because the

city of Rio de Janeiro had to claim land from the sea in order to meet the pressures of a growing population and the need for space. Older residents still recall the beach they swam in fifty years ago was situated much closer to Corcovado Mountain. From where we stand to observe this urban landscape, the odours of a polluted bay, the proximal view of litter and the noise of city streets envelop our senses. In the distance, there are offshore oil rigs nestled into the blindspot of a panoramic view enjoyed by tourists on top of Sugarloaf mountain. Today, Botafogo bay is so polluted that no one swims there.

Since Darwin published *The Origin of Species* in 1859, the global human population is more than five times larger, high density living has crossed over the 50% urban threshold and global carbon dioxide emissions have increased ten thousand per cent (Boden *et al.*, 2009). One of Darwin's intellectual predecessors, the 18<sup>th</sup> century French Naturalist George-Louis Leclerc Comte de Buffon, was one of the first to predict that deforestation and agriculture would warm the planet and delay an eventual ice-age. With bountiful rises in various forms of toxic excrement from urban and industrial centres, we are dancing precariously on the critical threshold of our planet's capacity to deal with human effluent. Human activity has made our future unpredictable and once we pass the tipping point, there will be no gradual transitions. Research on the resilience of complex systems indicates that the changes will be abrupt (Montenegro 2010).



**Figures 5 & 6:** Botafogo Bay and Copacabana Beach, Rio de Janeiro, April 2009.



**Figure 7:** Botafogo Bay, Rio de Janeiro, Brazil, April 2009

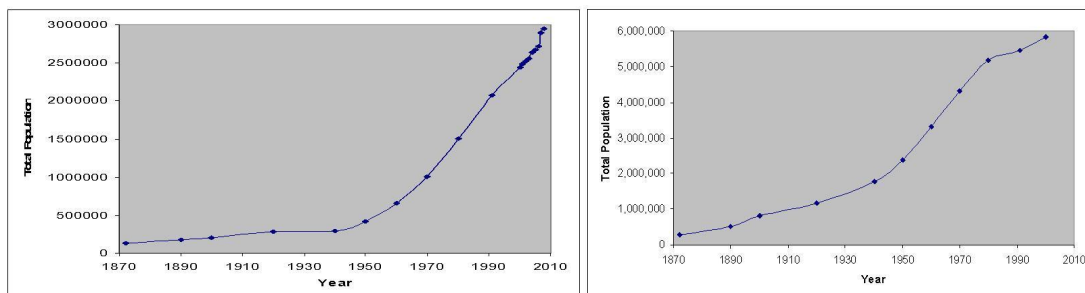
Today, only a thirty minute walk away from the deserted beach of Botafogo bay (figure 5), on the other side of Corcovado Mountain, Copacabana beach (figure 6) is full with people. The contrasting popularity of this beach is testament to a city of people who relish sun, sand and waves—when these elements are sanitary. Copacabana beach is set against a backdrop of man-made high-rise buildings and naturally formed mountains—an impressive picture of how humans adapt nature. The sprawl of the favelas that speckle Rio’s urban landscape is another reminder of how population growth encroaches upon the natural world. To stop the favelas further invading Rio’s remaining green environment, government authorities have started enclosing the favelas in walls that protect the forests and further compress the local populations, the poverty and pollution of these places. What is not pictured in these photos is the enormous amount of air pollution that is emitted by large urban centres like Rio. Reducing the rate of pollution in the atmosphere is a public health matter as well as an environmental matter.



**Figure 8:** Copacabana Beach, Rio de Janeiro, Brazil, April 2009

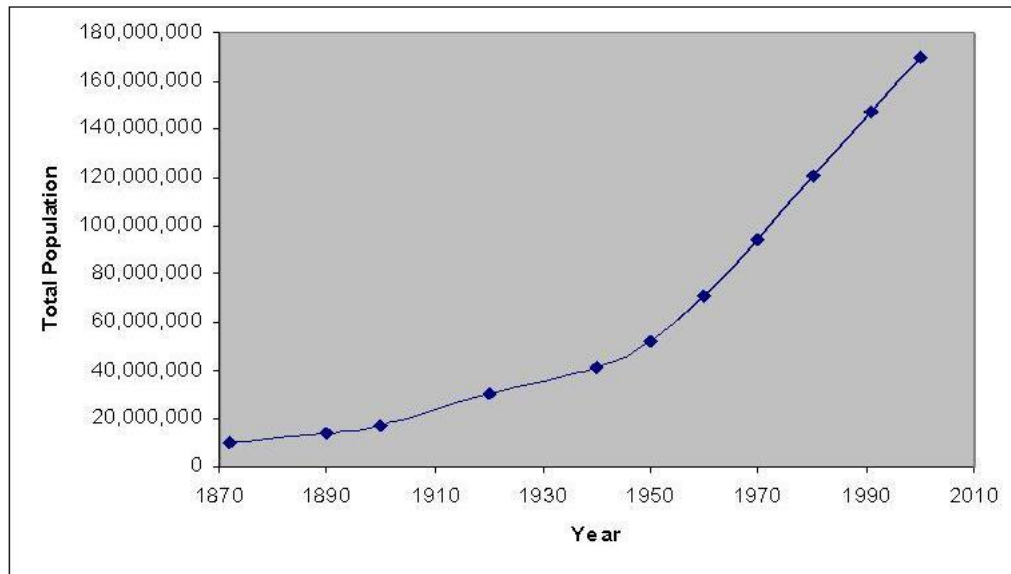
With these images in mind, it is comforting to learn that Brazil played a constructive role in the Copenhagen Climate Change Conference last year. The location of this conference in Scandinavia was somewhat fitting considering that almost a thousand years ago, Canute who was King of England, Denmark and Norway, drafted the very first forest conservation legislation (Short, 2009b:567). Canute’s “Carta de Foresta” listed 34 Forest Laws aimed at conserving forests at all costs, and especially their wildlife, with heavy penalties for offenders. For example, Law 28 includes: “No man may lay his hands upon the Kings demesne Woods without licence of the Verderor: for if he does, hee shall be aiudged guilty of the breach of the Kings free chase Royal.” Inspired by Canute’s laws, Professor Roger Short from the University of Melbourne recently suggested that “Perhaps each nation attending the Copenhagen conference might agree to create its own new forest — thereby preserving endangered species, combating global warming and honouring Canute’s apocryphal command to the seas to stop rising” (2009:567). Brazil and Norway have gone some distance to answer this call in schemes proposed to protect the world’s rainforests with funding from rich countries that cannot cut their emissions at home. But will saving the forests be enough?

The Copenhagen Climate Change Conference failed to make serious headway on a series of issues and frighteningly a raft of issues did not even make the agenda. One crucial topic that did not receive serious level-headed attention was overpopulation. The problem of overpopulation is one of the greatest ethical dilemmas we face as we begin to recognise our pivotal impact on the planet and start to actually do something about carbon emissions, pollution and poverty. If there were not so many of us, our levels of consumption would be reduced, our effluent would be minimised and our cultural habits would be manageable. A recent study at the London school of Economics has shown that for every seven dollars spent of family planning we can reduce more than one tonne of Carbon Dioxide emissions (Wire, 2009). The UN State of World Population Report suggests that if the global population peaks at 8 billion by the year 2050—instead of the predicted 9 billion—then this might result in one to two billion fewer tons of carbon emissions. These calculations and others lead us to the unsavoury conclusion that the biggest carbon footprint a human can leave is a child. But how do we go about ethically addressing the issue of population growth? Arguing, for example, that the world owes China carbon credits for the implementation of the one child policy is fraught with ethical concerns and social ramifications. Reducing human population growth is a necessity but hopefully it is an issue that can be approached through education not enforcement.



**Figures 9 & 10:** Growth of Human Population in Salvador da Bahia (pictured left), & Rio de Janeiro (pictured right), Brazil, 1872-2000 AD  
 x-axis = year, y-axis = number of people

Over the last 30 years, the population of the State of Bahia has grown by over 50%, while the population of the state's capital, the city of Salvador, has grown by almost 100%. Since the 1980s, urban migration to regional capitals like Salvador has increased. This shift in internal migration patterns places enormous demands on infrastructure and has been accompanied by a growth of pollution, poverty and epidemics. Dengue Fever, for example, was first recognised in Brazil in 1981 (Nogueira et al. 2002) with successive outbreaks and almost three million recorded cases in less than a twenty-year period (Teixeira et al. 2002). Disease and poverty, however, have done little to stop the overall population growth in Brazil.



**Figure 11:** Growth of Human Population in Brazil, 1872-2000

Brazil is reputed to have the widest gap between affluence & poverty (de Blij 2009). The richest 10 percent of Brazilians own two-thirds of all the land and control more than half of Brazil's wealth (Knapp 2002). Experts believe that the poorest one-fifth of Brazilians, over 34 million people, live in the most wretched conditions prevailing anywhere on Earth, even including the megacities of Africa and Asia (de Blij 2009). The marginal are not the masses living in poverty, but the minority privileged.

The urban population is increasing much faster in developing countries than in the more-developed regions. In the developing world, Brazil is considered to provide insights into the likely future of urbanization elsewhere (de Blij 2009:188). With widespread corruption, crime and contagions, what kind of bleak forecast does this suggest for other nations? In terms of carbon footprints, Brazil's carbon dioxide emissions already account for well over a third of South America's emissions (Boden *et al.* 2009). Such statistics beg the question, what will happen when the consumption patterns of highly urbanized societies become global?

As a short term solution to reduce global carbon dioxide emissions, James Lovelock has recommended that there should be an immediate switch from coal energy to nuclear energy (Lovelock, 2006). Certainly the French have offered us a model where electricity costs to households running on nuclear energy have been 30 to 40% lower than those of other European countries (Mallet & Lévêque, 2009). With UN

predictions that the human population will increase to between 8 billion to 10.5 billion in 2050, the conversion to nuclear power or renewable energy is one measure among many that will have to be given serious consideration and swift implementation in order to reduce carbon emissions.

Uncertainty exists as to whether economic activity is primed to facilitate the ethical actions we need to take in the face of global climate change. A fatal flaw in economic activity was foreseen as far back as the 18<sup>th</sup> century by the pioneer Scottish economist Adam Smith who argued that the economic behavior was motivated by self-interest (Ashraf et al. 2005). In *The Wealth of Nations* (1776), Smith wrote that, “The desire for food is limited in every man by the narrow capacity of the human stomach; but the desire for the conveniences and ornaments of building, dress, equipage and household furniture seem to know no limit or certain boundary” (Smith, 1776, quoted by Paganelli, 2009:85). Human culture empowers our ‘Selfish Genes’ and no negative feedback controls have been identified (Short, 2009a). The exploitation of the world’s resources through mining, deforestation, and the plundering of our oceans, is testament to the greed that Smith labelled as boundless and limitless. The technology that runs on renewable energy is already available. However, it is demoralizing that superpower petrol and mining companies are delaying the production and distribution of these technologies so that they can exhaust one resource before they turn to the next, thus keeping prices high during the sale seasons of both. It has become abundantly clear, our productivist civilization and rampant consumerism neglects the fragile homeostatic balance between cultural behaviours and delicate ecological constraints (Mason, 2005).

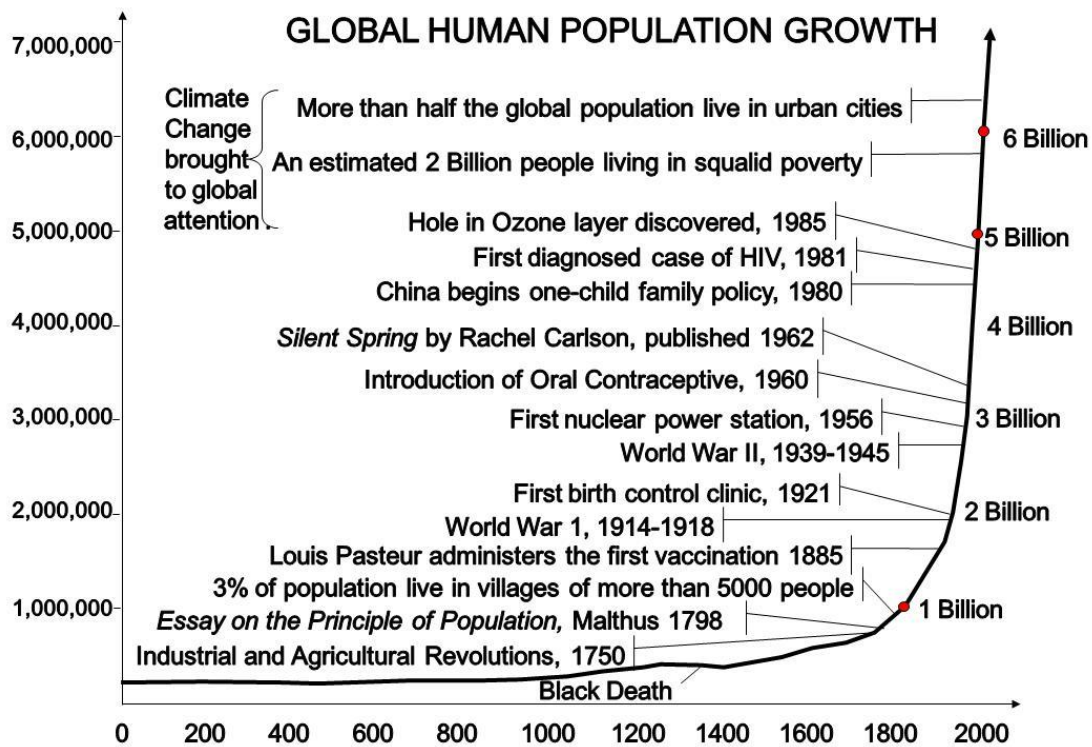


Figure 12: Human Population Checks vs Human Population Catalysts

2000 years ago the world population was less than 300 million. By the time of the voyages of Columbus to America, some 1500 years later, the population doubled to approximately 600 million (Diczfalusy, 1991). Nobel laureate, Paul Crutzen, recently proposed that in the latter half of the 18<sup>th</sup> century the world could be said to have entered a new geological epoch which we should call the Anthropocene since that was when human activities spurred on by the Industrial Revolution, began to dominate all the ecosystems on earth (Crutzen & Stoermer, 2000). It was only after the industrial and agricultural revolutions that the world population reached 1 billion, doubling by 1927 to 2 billion, and then taking only 50 years to double again (Diczfalusy, 1991). In the last 100 years alone, the world population has quadrupled.

At the dawn of the Anthropocene, the Reverend Thomas Robert Malthus, a clergyman, mathematician and Fellow of Jesus College, published *An Essay on the Principle of Population, As It Affects the Future Improvement of Society* (June, 1798). Malthus calculated that human populations left unchecked would increase geometrically, whereas the ability of the Earth to provide subsistence for this growing population would only increase arithmetically. He concluded that the power of population is indefinitely greater than the power in the earth to produce subsistence for man. Natural laws imply a strong and constantly operating check on population. In Malthus' view, the difficulty of subsistence would be continuously imposed upon a large majority of the human population who would always suffer from deprivation of the necessities of life.

Inspired by the French Revolution, many of Malthus' contemporaries were optimistic about the future and viciously attacked Malthus' bleak predictions. They saw humankind progressing ever upwards to a world of universal abundance, peace and prosperity, where all would be equal in health, wealth and happiness (Potts & Short 1999:286). The social reformers of the day, like Karl Marx, Frederick Engels and Samuel Coleridge could not accept the idea that the poor might stay with us (Short 1998). Robert Southey, the author of the detailed *History of Brazil* (1810-1819), violently condemned Malthus' theorem. "Mr Malthus is cast in his action against God Almighty," he remarked, "I will gibbet him in a pamphlet, and draw and quarter him" (Poynter, 1969:168). In the face of disbelief and criticism, subsequent events have debunked the utopian fantasies of Malthus' critics and verified his dismal premonition about the difficulty of subsistence. Sadly, Malthus' dystopian vision prevailed.

The economist John Maynard Keynes described Malthus' essay as "a work of youthful genius" (O'Donnell 2006:399). However, the highest praise for Malthus' work came from Charles Darwin and Alfred Russell Wallace, who independently stated that Malthus' essay was one of the most influential books that either of them had ever read, since it provided the key to understanding how the survival of the fittest could lead to natural selection, and ultimately the origin of new species (Potts & Short, 1999:286).

The exponential growth in population is contrary to Malthus' forebodings. He thought that late marriage, high levels of infant and childhood mortality, wars, abortion, infanticide, plague, pestilence and famine would act as preventive and positive checks on further population growth. Malthus failed to anticipate advances in agricultural technology, the drop in infant mortality and the rise in life expectancy. However, he was also unaware of pesticides, detergents, solvents, bioaccumulation, hormone

disruptors, developmental toxicants, carcinogens, acid rain, ozone problems and fossil fuel emissions. Global warming is just one among many threats to sustaining human life, wildlife and the natural environment (Potts, Pebley & Spiedel, 2009). In some places, we are even turning our agriculture into a non-renewable resource (Diamond, 2005). Today, when we consider the relationship between population growth and the physical environment, demography has advanced little beyond Malthusian arithmetic (Hogan, 1992). In aligning our cultural habits with our ecological boundaries, we have done little to take control and sequester human population growth.

During a recent conference at UCLA, it was forecast that by the end of 2009 there will have been 78 million more births than deaths with over 95% of this growth coming from low-income countries (Potts *et al.*, 2009). Coupled with the estimations that there are over 80 million unintended pregnancies every year, we can deduce that if we were to hypothetically reduce unintended pregnancies then supposedly population growth would be kept in check. It is known that access to contraception, safe abortion and family planning decreases family size. It is also known that education, particularly of women, makes an important contribution to fertility decline. With the spread of access to internet resources growing, welfare groups might just have found their medium of communication for free education. The far-reaching advances in technology and communication is changing how millions of people in the developing world interact (Friedman, 2005; de Blij, 2009). With internet access even found in refugee camps around the world, free education has for the first time the potential to be a realistic proposition. Learning resources translated, animated and made available through the internet may turn out to be a primary access point for a significant proportion of the one billion young people aged 15 to 24 who live with limited educational and employment opportunities. Certainly, no nation who has a vested interest in the future can afford to create a class of people who are not part of the online community (Spender, 1999:255).

Al Gore is one of the early pioneers of the legislative building blocks that helped establish the internet infrastructure. He is one of the most recent on the international stage to draw the conclusion that Global warming is the result of human activities (Gore, 2006). Perhaps Gore had already come to the conclusion that population growth only exacerbates the problem when in 1999 he opposed South Africa's Medicines and Related Substances Control Amendment Act aimed at providing low-cost AIDS therapy drugs to a population where 22 per cent of sexually active adults were infected (Wadman, 1999). Western pharmaceutical companies have displayed little interest in producing drugs for the developing world, not only because there are little profits to be made, but also because they would not make as much profit in developed countries if customers realized that these drugs can be produced and sold at cheaper prices. Maybe Al Gore might not see a problem with this mentality when it comes to AIDS medication, but if those of us in developed nations would like to hold on to our natural luxuries a little longer then perhaps we should consider the cheap distribution of steroidal contraceptives.

It has been found to be more profitable for the big pharmaceutical companies of the Western world to keep all steroidal contraceptives available only through medical prescription. There is absolutely no medical justification for this cautionary action (Trussel *et al.*, 1994) but covertly it enables the pharmaceutical companies to exploit doctors as their unpaid sales force, whilst at the same time maintaining a relatively

high price for a product that is off patent, and could be made for next to nothing (Short, 1999a). This medicalisation of contraception denies access to those who need it most – impecunious, uninformed and reticent teenagers all over the world who are reluctant to reveal their nascent sexuality in potentially volatile and seemingly un-navigated social and religious settings (*Ibid.*). Western pharmaceutical corporations with their profit-driven objectives (Angell, 2004) are not offering solutions. Donor agencies, however, can turn to the pharmaceutical companies of the developing world, such as those in China, India, Indonesia and Thailand.

In Brazil, abortion is illegal, but the morning-after pill can be obtained over-the-counter for between five and ten dollars. Unfortunately, the number of people living on less than a dollar a day puts the pill out of reach of a large proportion of the population. With the unmet need for contraception in low income countries calculated to increase to 722 million in 2015 (Potts *et al.*, 2009), it is time to take steps toward a global solution to whatever degree we can. A decade of lost opportunities to increase contraceptive prevalence was noted as recently as the 1980s (Diczfalusy, 1991). Now, at the beginning of the 21<sup>st</sup> century, it is important to consider what measures we will go to, which cultural habits will be sustainable and what solutions we can implement in order to reduce our impact on the ecology of our world.

The Lancet's recent commission on the effects of climate change on health offers a reliable diagnosis of pertinent contemporary issues on a global scale (Costello *et al.*, 2009). One of the conclusions of this report is that "The most urgent need is to empower poor countries, and local government and local communities everywhere" (*Ibid.* p.1728). Why should there be a concern about population growth in developing countries who contribute the least to the pollution associated with climate change? These concerns are important because these countries will be the worst affected by the inevitable consequences of global warming, unpredictable weather patterns and increasing competition for resources. With rising sea levels, escalating fresh water shortages and the increasing spread of epidemics and contagious diseases, there is no doubt that resources among the world's poorest communities will be limited the most. How can we expect the people of the developing world to learn from our mistakes, if we ourselves are not demonstrating the lessons learnt?

Historically, our track record at reacting to impending peril is fairly poor. Humans have lived in zones prone to natural disaster for centuries, and in full awareness of the inevitable dangers. Flood plains, volcanic islands, fault lines, hurricane regions and tornado areas have been and still are home to humans who have decided that the short-term benefits outweigh a catastrophic risk that has struck somewhere in history and will strike again somewhere in the future. History has shown that these threats have been misjudged by a species that miscalculate the profits and perils of place. Our brains have proven ill-equipped to respond to dangers that require substantial forethought. However, today, as the entire earth is fast becoming the site of imminent catastrophe, we are beginning to demonstrate the signs of overcoming our neurological shortcomings. The tools of culture that are giving us certain premonitions of the future are also giving us the inspiration to shape our fate. Notably, in the developed world, we are beginning to see the burgeonings of an expanded consciousness where people are becoming aware of peripheral issues and making them central to their lives in very active and dynamic ways. If we accept the assumption that "Larger populations make innovation more likely" (Bloom *et al.*,

2009), then we must hope that human cultures will be able to adapt quickly to the radical technological solutions we now have to adopt.

Paul Ehrlich (1968; 2008) has argued for several decades that population pressure on natural resources and the environment is a contemporary issue that has been ignored by policy makers (Bloom *et al.* 2009). His often exaggerated arguments have left doubts, but for others it has become clear that "maintaining the population size does not seem to be a valid aim of population policy" (Bijak *et al.*, 2005:27). If we do avoid a potential global disaster by reducing population size, strict socio-economic measures will have to be put in place to avert the negative economic effects of population and labour force ageing. In this scenario, policy makers will need to pay attention to the experience of countries like Japan where the fertility rate is around 1.3 children per woman (Clark *et al.*, 2009). The projections of Bijak *et al.* (2005) for 27 European countries from 2002 to 2052, "show that the long-term consequences of demographic change should be treated by social policy-makers and politicians whose temporal perspective exceeds the nearest election, with due attention" (Bijak *et al.*, 2005:28).

The first warnings of cataclysm predicted by Malthus over 200 years ago give the verisimilitude of having taken too long to reach the public sphere. Only the future can tell if the measures we are taking will have been too little too late. If one was to bet on how much should be done, then in the spirit of a Pascal Wager, it is better to bet on the reality of overpopulation, urbanisation and consummation exacerbating carbon dioxide emissions.

The world's population was one billion when Malthus made his gloomy predictions. Today, it has increased to 6.8 billion. Malthus could not have predicted that it would be our own effluent, the increasing concentration of carbon dioxide in the atmosphere, which might be the ultimate check to population growth. "The time-honoured phrase 'The sky is the limit' has taken on a sinister new meaning" (Short, 2009a).

Professor of Sustainability at Murdoch University, Glenn Albrecht, has coined the word 'Solastalgia' which he defines as the pain experienced when there is recognition that the place where one resides and that one loves is under immediate assault—a form of homesickness one gets when one is still at home (Albrecht, 2005; Smith, 2010). Albrecht has diagnosed this disorder among communities who are living amidst visible environmental changes brought by pollution and climate change. He differentiates solastalgia—which occurs when the environment you call home changes unrecognisably—from nostalgia—which occurs when you are physically displaced from home. Solastalgia, just like nostalgia, can lead to emotional, psychological and physical distress. This distress, particularly in the case of solastalgia, may be the privileged emotional state of people who can afford to care.

The people of the shantytowns in Salvador da Bahia and Rio de Janeiro live in uncertain environments. One could hypothesise that people in these communities would be prime candidates to suffer from solastalgia. The environment they call home can be under threat from government organisations, tourist developments or commercial enterprises. Sometimes, extreme weather conditions affect these areas more than affluent centers of living with more robust architecture, infrastructure and urban planning. Unlike richer members of society, few shantytown dwellers have the

means to take action against social and environmental changes without resorting to violence.

Take for example, the district of Pelourinho in Bahia. Today, Pelourinho is a lively epicentre of music, dance and restaurants, and has become the historical and cultural draw-card for tourists to this region. What many tourists do not realise, however, is that the Pelourinho district underwent massive restoration efforts under the government in the early 1990s. “In its early stages, the renovation jarringly juxtaposed the freshly painted pastel exteriors of the old buildings with the overcrowding and dire poverty of the residents inside” (Butler, 1998: 170). The area had become home to the poor who were forced from their homes. Anyone who resisted removal were dislodged at gunpoint by the state police and only the lucky ones were paid a minimal compensation averaging US\$400 and \$800 (*Ibid.*). Studies show that of the 1300 families living in Pelourinho in 1992, only about 200 were able to remain in the neighbourhood (Collins, 2004: 212). Those who have seen the changes can tell you how much the tourist development of Pelourinho affected the lives of the people that lived there. But even without a mastery of Portuguese, a traveller does not have to wander far off the pretty streets of Pelourinho to see a community in disarray.



**Figures 13 & 14:** The busy streets of Largo do Pelourinho in the 1950s (left), Photograph by Alice Brill. The empty façades of the Largo do Pelourinho in 2009 (right), Photography by Puneet Singh.

Fieldwork around Pelourinho, and Salvador in general, left me with haunting memories of pregnant women high on drugs, old drunken men wielding screwdrivers as weapons and seven year olds with pocket-knives and guns. Written on their faces was written a sentiment deeper than solastalgia. It was indifference. Solastalgia is a disorder of people who can afford to care, but sometimes care can find no justification. Caring about something that we believe will inevitably change despite our best efforts can be unproductive to survival. There is no promise of a reward for the energy spent. In these situations, indifference can become a culturally entrained way of being with crime a direct result. The long queue of tourists who line up daily at the tourist-police bureau in Pelourinho is testament to the amount of crime that plagues the Pelourinho district. Tourists are not being robbed by people with negative sentiments towards them, tourists are being robbed by people who are indifferent towards them.

Pelourinho is not an isolated example and this kind of treatment towards longtime shantytown residents in the various favelas around Brazil is ongoing. Importantly though, the case of Pelourinho demonstrates that the psychological effects of solastalgia are not as concerning as the psychological defense against solastalgia. The indifference and resignation that the sensitive observer can read on the faces of petty criminals in Pelourinho; the indifference that can lead a seven year old to hold a gun to a person's head and demand money; the indifference that can allow a pregnant mother to abuse drugs; are all examples of a psychological defense against the debilitating emotion of 'care' in a world that has taken away even the most fundamental security of 'home' and removed all sense of place.

In subtle yet alarming ways, a culture of indifference has been creeping into societies who are beginning to understand that the planet we call home is changing beyond our immediate control. In Australia, my own country, I am starting to see the cultural entrainment of 'indifference' taking place with respect to climate change. From my days at primary school in Victoria, I can remember learning about pollution, the greenhouse effect, acid rain, global warming, climate change, deforestation, exploitation of marine life, overpopulation and poverty. And yet, today so many of my peers either seem numb to the topics or they simply have a jerk reflex whenever the issues are raised. Often the topic is changed all too easily.

In the effort to persuade holdouts in the environmental discussion, we have bombarded the public indiscriminately with depressing images of the environment under assault. In doing so, we may have created a situation that actually contributes to the demobilisation of those who are concerned. The message meant to prod the indifferent may actually overwhelm those who already care, breeding greater insensitivity. Perhaps an overwhelming solastalgia can lead us to avoid the issues, ignore the problems and consciously overlook what we really need to be doing. The idea that our carbon consumption may be contributing to something irreversible, is an idea that is maybe too much to bear and in an act of self-preservation, in a defense against overwhelming solastalgia, we have learnt to become indifferent. When faced by the choice between consumption and conservation, indifference blindly justifies our patterned submission to consumer-driven behaviour.

In contrast to symptoms of despair, Albrecht has also diagnosed signs of hope. His most recent research is about Soliphilia: "the love of and responsibility for a place, bioregion, planet and the unity of interrelated interests within it" (Smith, 2010). Soliphilia is associated with positivity, interconnectedness and personal empowerment. If we can make our psychological defense against solastalgia into the positive manifestation of soliphilia, then we can definitely improve the interplay between human beings and their environment for generations to come.

In new and imaginative ways, it is time for us to realise our humanity. For Australians, it is worth considering if our agriculture, at the current levels of production, is a less renewable resource than our mineral resources. Diamond (2005) has calculated that Australia, the world's driest continent, can only sustainably support 8million people with its own natural produce. With suggestions by some politicians to expand our population to 35million by 2050, perhaps we need to seriously reconsider the relationship between economics and the environment. The economy empowers our greed exponentially, but the environment has limits.

## **Le Brésil au XIX<sup>ème</sup> et XXI<sup>ème</sup> siècle: Une étude sur la croissance de la population, de l'urbanisation et de la pollution dans le monde en voie de développement**

Par Paul H. Mason

### Résumé:

Le Brésil est un pays caractérisé par d'importants contrastes entre la pauvreté et la richesse, la beauté et la pollution, les 'bidonvilles' et les 'gratte-ciel(s)'. Dans le monde en voie de développement, le Brésil est considéré comme un exemple de ce qui peut arriver autre part lorsque l'urbanisation est probable. La population urbaine augmente beaucoup plus rapidement dans les pays en voie de développement que dans les régions plus développées. Qu'arrivera-t-il alors, lorsque le modèle de consommation des sociétés hautement urbanisées deviendra global? Avec la croissance de la population devenue incontrôlable, quelles seront nos limites?

Le Brésil est un pays caractérisé par d'importants contrastes entre la pauvreté et la richesse, la beauté et la pollution, les 'bidonvilles' et les 'gratte-ciel(s)'. Le pays se trouve être le site des deux premiers débarquements lorsque le "Beagle" a accosté à Salvador de Bahia et à Rio de Janeiro. Cette aventure historique dans le domaine de l'histoire naturelle et de la géologie est devenue la base essentielle du livre de Darwin, *L'Origine des Espèces*, dont nous avons célébré le 150<sup>ème</sup> anniversaire l'année dernière. L'année de la plus célèbre publication de Darwin est aussi caractérisée par le commencement d'une nouvelle période de consommation de combustibles fossiles lorsque les premiers puits de pétrole ont été forés. Augustus Earle et Conrad Martens, deux artistes du 19<sup>ème</sup> siècle qui accompagnaient le "Beagle" à différentes étapes, nous ont laissé des esquisses et des aquarelles qui illustrent l'importante différence avec les photos d'aujourd'hui. Les changements sur les territoires humains durant cette période sont liés à la croissance de la population, de l'urbanisation et de la pollution. Depuis 1859, la population humaine a augmenté plus de cinq fois, la densité de la population a dépassé la limite des 50% et l'émission mondiale de gaz carbonique a augmenté de 10 000% (Boden et al. 2009).



**Images 1 & 2:** Botafogo Bay et Copacabana Beach, Rio de Janeiro, Avril 2009.

La plage de Botafogo est tellement polluée que personne ne s'y baigne et que seul un petit nombre de personnes s'y promène. Le même jour, à seulement 30 minutes à pieds de là, la popularité de Copacabana contraste avec la baie de Botafogo qui est désertée.



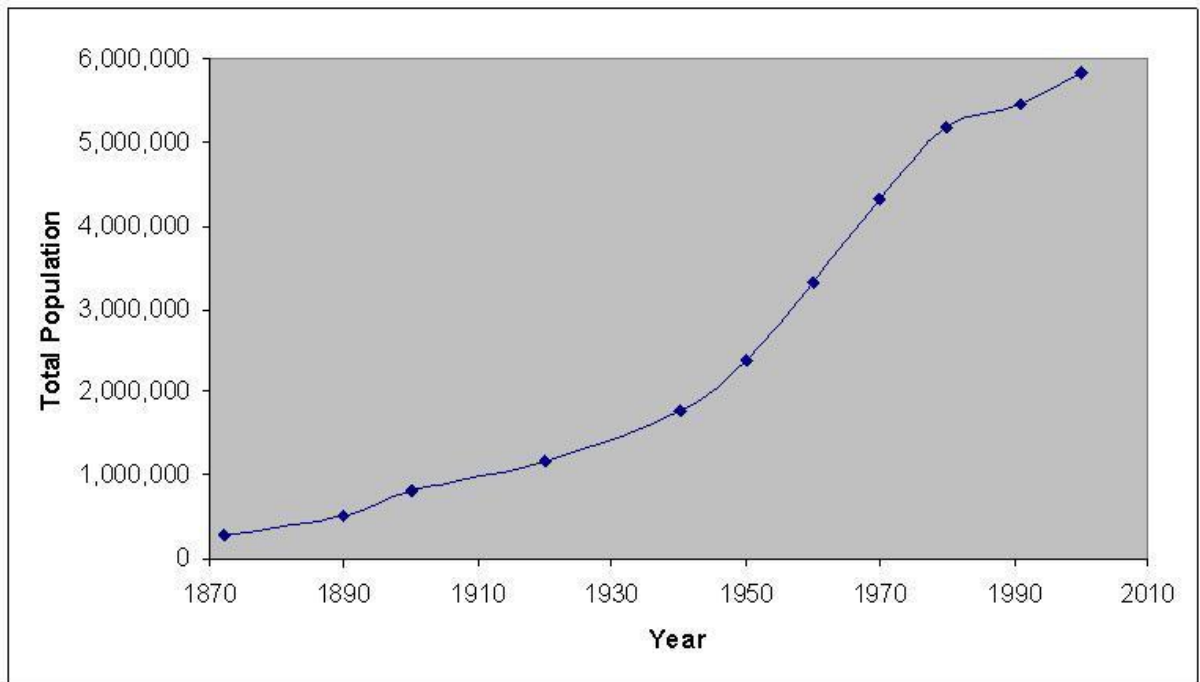
**Images 3 & 4 :** Conrad Martens, une aquarelle de Botafogo Bay au 19<sup>ème</sup> siècle, comparé à Botafogo Bay, Rio de Janeiro, Brésil, Avril 2009.

Pour faire face aux pressions de la croissance de la population et du besoin d'espace, la ville de Rio de Janeiro a dû reprendre du terrain sur la mer. Les anciens résidents se rappellent que la plage où ils se baignaient il y a cinquante ans, était située beaucoup plus près de la montagne du Corcovado. De notre point d'observation de ce paysage urbain, les odeurs d'une baie polluée, la proximité des débris et le bruit des rues de la ville mobilisent tous nos sens. L'endroit sur la plage où la photo de Botafogo Bay a été prise est un site plein d'ordures où vit un Sans Domicile Fixe. Il y a des déchets partout et un feu de camp éteint.

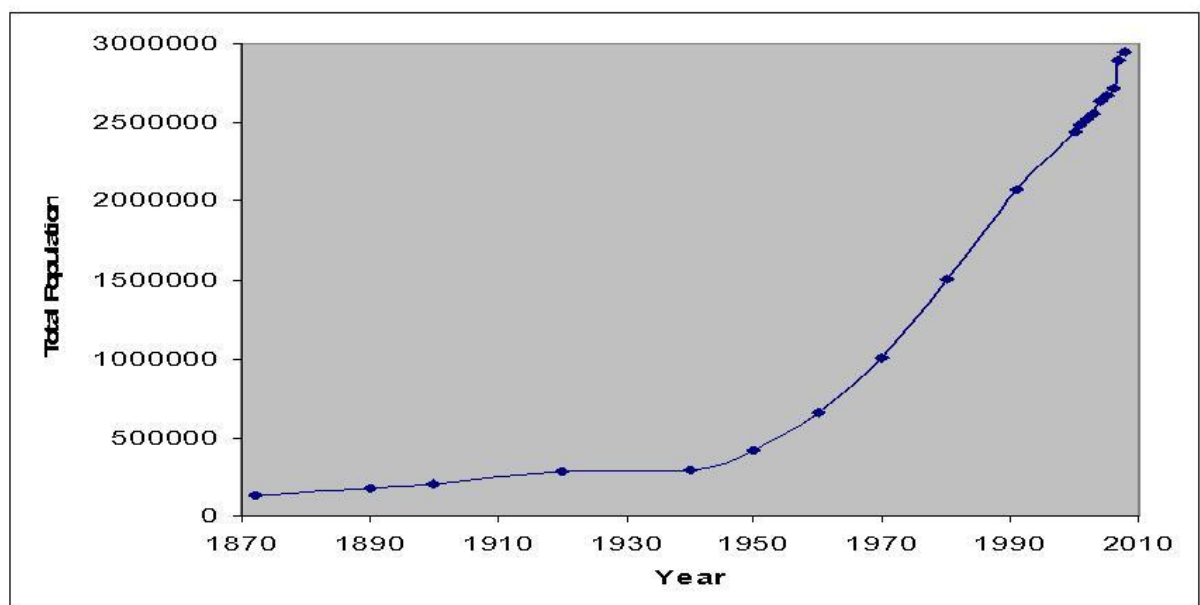


**Images 5 & 6 :** dessin du 19<sup>ème</sup> siècle de Salvador de Bahia par Auguste Earle, comparé au même endroit au Brésil, en avril 2009.

Le Fort São Marcelo et l'église Igreja Conceição de Praia ont survécu mais le théâtre Sao Joao a été démoli en 1922 et remplacé plus tard, par le palais des sports. La place où Augustus Earle s'est assis pour dessiner cette ville est maintenant un lieu où les touristes sont prévenus par les habitants locaux de ne pas s'y aventurer à cause d'attaques à main armée, de violence et de vols, dus à l'augmentation des pressions économiques de la pauvreté urbaine.

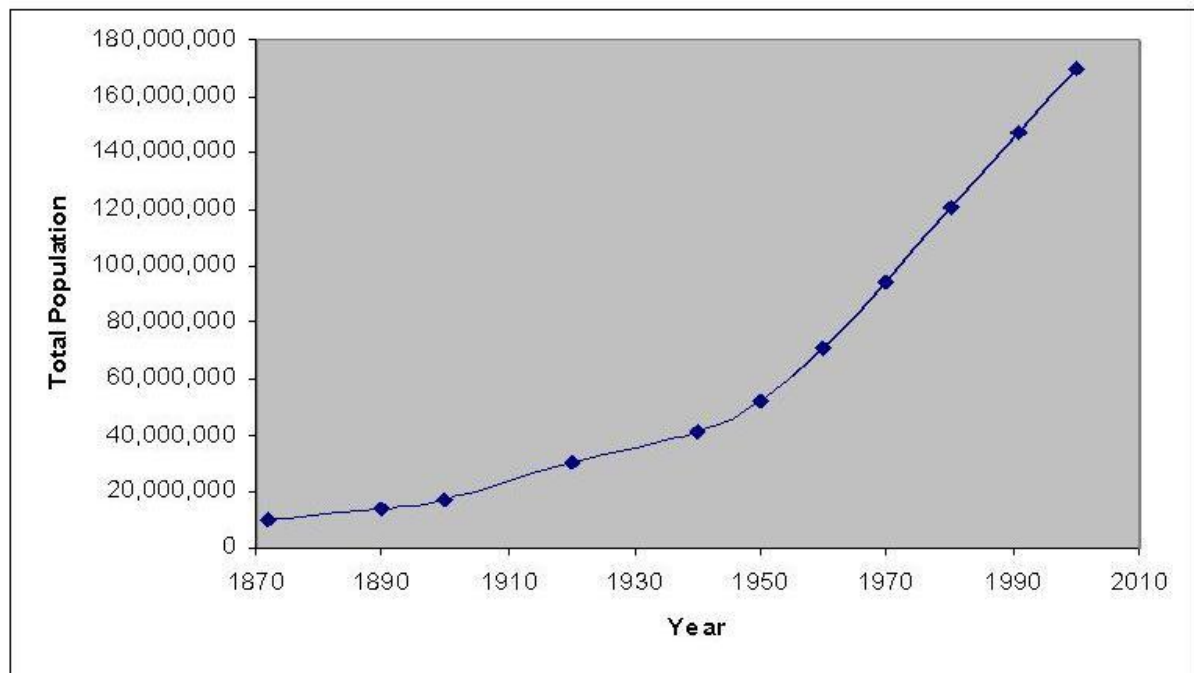


**Image 7** : croissance de la population de Rio de Janeiro, au Brésil, de 1872 à 2000; (X = années, Y = population). Source : Instituto Brasileiro de Geografia e Estatística



**Image 8**: croissance de la population de Salvador da Bahia, au Brésil, de 1872 à 2008; (X = années, Y = population). Source : Instituto Brasileiro de Geografia e Estatística

Durant les 30 dernières années, la population de l'état de Bahia a augmenté de plus de 50% alors que la population de la cité Salvador a augmenté de presque 100%. Depuis les années 80 la migration urbaine vers les capitales régionales telles que Salvador, a augmenté. Ce changement de la migration interne a créé une demande énorme d'infrastructures et a été accompagné par une croissance de la pollution, de la pauvreté et des épidémies. Par exemple, la 'dengue' a été reconnue au Brésil en 1981 (Nogueira et al. 2002), en vagues successives et presque 3 millions de cas ont été enregistrés dans une période de moins de 20 ans. La pauvreté et la maladie n'ont cependant pas beaucoup affecté la croissance de la population du Brésil.



**Image 9** : croissance de la population du Brésil, de 1872 à 2000. X = années, Y = population. Source : Instituto Brasileiro de Geografia e Estatística

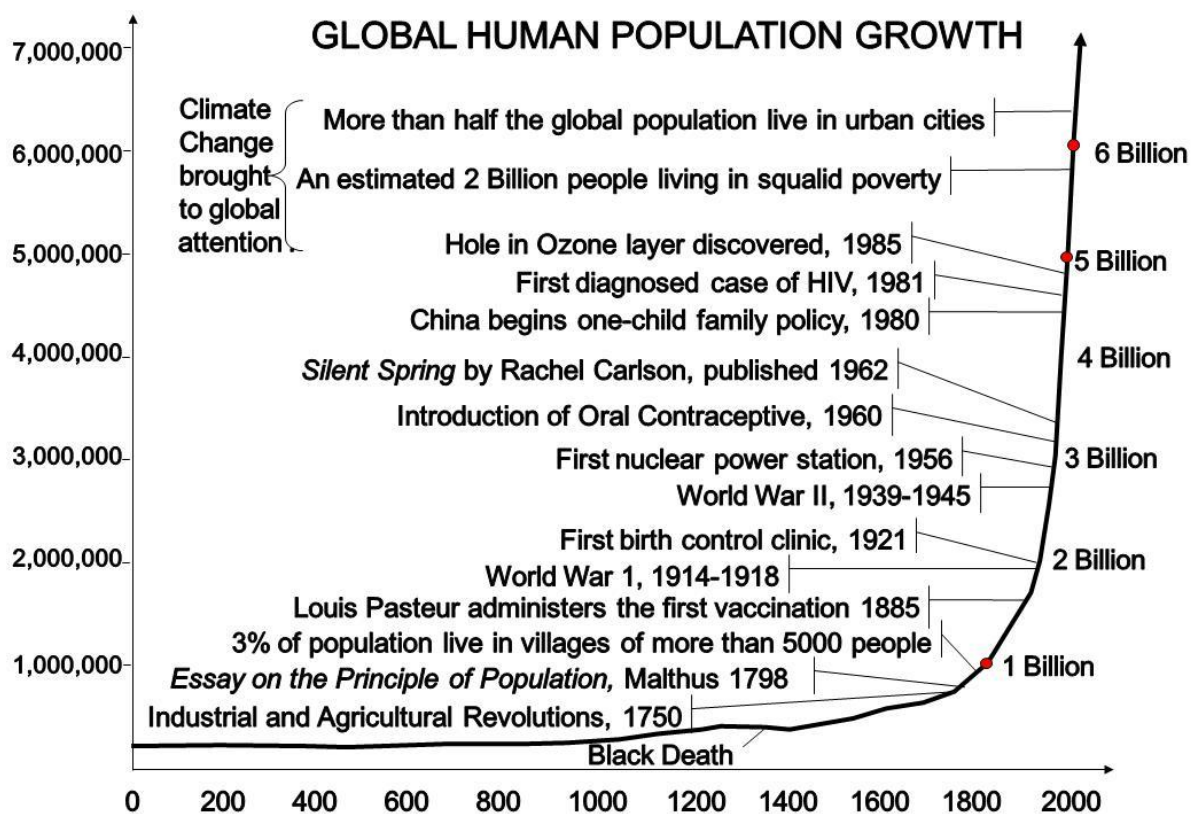
Le Brésil est réputé pour l'important décalage entre la densité de population et la pauvreté (de Blij, 2009). 10% des Brésiliens les plus riches possèdent 2/3 des terrains et contrôlent plus de la moitié de la richesse du Brésil (Knapp, 3002). On estime qu'un cinquième de la population la plus pauvre des Brésiliens, plus de 34 millions, vit dans les conditions les plus misérables que l'on trouve sur la terre, même comparé aux méga-cités d'Afrique ou d'Asie (de Blij, 2009). Les "marginiaux" ne sont pas les masses vivant dans la pauvreté mais la minorité privilégiée.

La population urbaine augmente beaucoup plus rapidement dans les pays en voie de développement que dans les régions plus développées. Dans le monde en voie de développement, le Brésil est considéré comme un exemple de ce qui peut arriver autre part lorsque l'urbanisation est probable (de Blij, 2009: 188). Considérant l'étendue de la corruption, de la criminalité et des maladies contagieuses, quelle sorte de lugubre futur peut-on prévoir pour les autres nations? En ce qui concerne l'émission de gaz carbonique, le Brésil est responsable pour plus d'un tiers des émissions de l'Amérique du Sud (Boden et al. 2009). Qu'arrivera-t-il lorsque le modèle de consommation des sociétés hautement urbanisées deviendra global? Combien de Terres faudra-t-il pour supporter l'humanité?

James Lovelock a recommandé qu'on commence à utiliser l'énergie nucléaire le plus tôt possible, tout au moins comme solution à court terme, afin de réduire les émissions de gaz carbonique (Lovelock, 2006). La France a offert un modèle où le coût de l'électricité à l'usage domestique est de 30 à 40% moins cher que dans les autres pays d'Europe (Mallet & Leveque, 2009). Considérant les prévisions des Nations Unis, selon lesquelles la population atteindra de 8 à 10.5 milliards en 2050, cette mesure est un critère, parmi bien d'autres, pour envisager sérieusement et rapidement sa mise en œuvre.

En 1776, l'économiste Écossais Adam Smith a prévu une erreur fatale dans l'économie. Il a expliqué que, pour chacun, le désir de nourriture est limité par la capacité de l'estomac mais que le désir des commodités, de la décoration des habitations, de la mode, des voitures et des meubles, semble ne pas connaître de limites ou de frontières (Ashraf et al. 2005; Paganelli, 2009:85). La culture humaine a été supplantée par le pouvoir sur nos "gènes égoïstes" ; aucune tendance inverse n'a pu être identifiée dans les archives. L'exploitation des ressources du monde avec les mines, le déboisement et le pillage des océans, est un témoignage de l'avarice que Smith avait qualifié de "sans limite et sans frontière".

Les technologies basées sur l'énergie renouvelable sont déjà accessibles. Cependant, il est évident que les compagnies minières et pétrolières des grandes puissances retardent la production et la distribution de ces technologies afin de pouvoir épuiser une ressource et avant de passer à la prochaine, ce qui permet de conserver les prix hauts durant les périodes de vente des deux. Il est évident que notre civilisation "productiviste" et consumériste néglige le fragile équilibre entre le comportement culturel et les délicates sinon difficiles contraintes écologiques (Mason, 2005).



**Image 10 :** les contrôles sur la Population Humaine Population vs Les Catalyseurs de l'augmentation de la Population

Il y a 2000 ans la population de la terre était de 300 millions. Il a fallu environ 1500 ans avant que la population n'augmente pour atteindre jusqu'à 600 millions au moment des voyages de Christophe Colomb en Amérique (Diczfalusy, 1991). Paul Crutzen a récemment proposé que dans la dernière moitié du XVIII<sup>ème</sup> siècle on pourrait dire que le monde est entré dans une nouvelle ère géologique que nous

pourrions appeler ‘ ‘ l'Anthropocène’ ’ parce que cela correspondrait à l'époque où les activités humaines, catalysées par la Révolution Industrielle, ont commencé à dominer tous les écosystèmes de la terre (Crutzen & Stoermer, 2000). C'est seulement après la révolution agraire et industrielle, et avec les progrès en médecine, que la population a augmenté jusqu'à 1 milliard ! Depuis, la population a doublé (2 milliards) en 1927, et doublé à nouveau (4 milliards) en 1977 (Diczfalusy, 1991), et va doubler encore dans les années qui viennent.

A l'aube de l'Anthropocène, le Révérend Thomas Robert Malthus, un ecclésiastique, mathématicien et ‘Fellow of Jesus College, Cambridge’, a publié un *Essai sur le Principe de Population, son effet sur la future amélioration de la société* (Juin, 1798). Malthus calcula que la population humaine, sans contrôle, augmenterait d'une façon géométrique, alors que la possibilité d'assurer sa subsistance n'augmenterait qu'arithmétiquement. Il en conclut que la croissance de population est infiniment plus grande que les possibilités qu'offre la Terre pour assurer la subsistance de l'homme. Les lois de la nature supposent un sévère et constant contrôle de la population. D'après Malthus, la difficulté de survivre serait continuellement imposée à la plus grande partie de la population qui souffrirait constamment de privations. Inspirés par la Révolution Française, beaucoup de contemporains de Malthus considéraient l'avenir avec optimisme et condamnèrent sévèrement ces lugubres prédictions. Ils voyaient l'humanité progresser sans cesse vers un monde d'abondance universelle, de paix et de prospérité, où tous les hommes seraient égaux en santé, richesse et bonheur (Potts & Short, 1999: 286 ). Les réformateurs sociaux de l'époque, comme Karl Marx, Frederick Engels et Samuel Coleridge ne pouvaient accepter que la pauvreté soit inévitable (Short, 1998). Robert Southey, l'auteur de *L'histoire du Brésil*, (1810-1819), condamna sévèrement la théorie: « Mr. Malthus est connu pour ses actions contre Dieu Tout-Puissant ; dans un de mes pamphlets, il sera pendu, éviscéré et écartelé » (Poynter, 1969:168). En vue de l'incrédulité et de la critique, des événements subséquents ont discrédité sa funeste prémonition sur la difficulté de survivre. Malheureusement, sa vision dystopique l'emporta.

L'économiste John Maynard Keynes a décrit l'essai de Malthus comme « le travail d'un jeune génie » (O'Donnell, 2006 : 399). Cependant, les plus hautes éloges du travail de Malthus viennent de Charles Darwin et Alfred Russell Wallace, qui, indépendamment, ont déclaré que l'essai de Malthus était le livre le plus influent que l'un ou l'autre n'aient jamais lu, car il fournissait la clef qui permettait de comprendre comment la « Loi du plus fort ou la lutte pour la vie » peuvent conduire à la sélection naturelle et, ultérieurement, à l'origine des espèces (Potts & Short, 1999:286). La croissance exponentielle de la population contredit les prédictions de Malthus. Il pensait que les mariages tardifs, l'importante incidence de mortalité infantile, les guerres, les avortements, l'infanticide, la peste, la peste, les parasites et la famine constitueraient un contrôle à la fois préventif et efficace sur la croissance de la population.

Malthus n'avait pas prévu les progrès en technologie agraire, la chute du taux de mortalité infantile et l'accroissement du temps de vie. D'autre part, il n'a pas pris en compte les pesticides, les détergents, les solvants, la bioaccumulation, les effets disruptifs des hormones, le développement de produits toxiques et cancérigènes, les effets des pluies acides et l'utilisation intensive des carburants. Le réchauffement de la planète est seulement un risque parmi beaucoup qui menace la vie humaine, la faune et l'environnement (Potts, Pebley & Spiedel, 2009). Dans plusieurs pays, nous

transformons même l'agriculture en ressource non-renouvelable (Diamond, 2005). Aujourd'hui, lorsque nous considérons la relation entre l'augmentation de la population et l'environnement, la démographie a peu changé depuis les calculs de Malthus (Hogan, 1992). En alignant nos habitudes culturelles sur nos limites écologiques, nous avons fait peu de choses pour contrôler l'augmentation de la population. La population du monde était de 1 milliard quand Malthus a publié ses lugubres prédictions; aujourd'hui, elle est supérieure aux prévisions d'alors (près de 7 milliards). Malthus ne pouvait pas prévoir que nos propres émanations toxiques, l'augmentation constante de la concentration de gaz carbonique dans l'atmosphère, pourraient devenir l'ultime contrôle de la population. Le vieil adage: "The sky is the limit" (Tout est possible; le ciel est la limite) a pris une nouvelle signification plutôt sinistre (Short, 2009).

Lors d'une conférence récente (UCLA, 2009), les prévisions indiquaient qu'en l'année 2009 il y aurait 78 millions de naissances de plus que de décès, et 95% de cette croissance serait en provenance des pays de faible revenu (Potts et al. 2009). De plus, si l'on considère les estimations prévoyant plus de 80 millions de grossesses accidentelles chaque année, on pourrait en déduire que si nous pouvions par hypothèse éviter toutes les naissances non désirées, la population humaine serait stabilisée. Par ailleurs, il est connu que l'accès au planning familial, à la contraception, à l'interruption volontaire de grossesse feraient décroître le nombre d'enfants. On sait également que l'information et l'éducation, des femmes en particulier, contribuent de manière sensible au déclin de fertilité. Avec le développement de l'accès à l'Internet, les sociétés de bienfaisance ont, peut-être trouvé le moyen de communication pour une éducation gratuite. Avec l'Internet accessible, même dans les camps de réfugiés, la suggestion n'est peut-être pas irréalisable. Les sources d'éducation, gratuites, traduites en plusieurs langues, animées et accessibles sur Internet peuvent constituer une voie d'accès plus aisée pour une part importante du milliard de jeunes gens, de 15 à 24 ans, qui vivent avec des possibilités limitées en matière d'éducation et d'emploi.

Al Gore est un des plus récents sur la scène internationale à conclure que le réchauffement global de la terre est le résultat des activités humaines (Gore, 2006). Peut-être était-il déjà arrivé à la conclusion que la croissance démographique était à la source du problème quand en 1999 il a joué un rôle important en aidant les industries pharmaceutiques à bloquer la distribution des traitements bon marché dans la lutte contre le SIDA en Afrique du Sud (Wadman, 1999). Les industries pharmaceutiques occidentales ont montré peu d'intérêt à produire des médicaments pour les pays sous-développés, non seulement parce qu'il y a peu de profit à réaliser, mais aussi parce qu'elles feraient moins de profit dans les pays développés si les clients réalisaient que ces médicaments pouvaient être fabriqués et vendus à meilleur marché. Peut-être Al Gore ne pouvait-il pas voir une difficulté avec cette mentalité par rapport aux traitements envisagés contre le SIDA ; cependant, ceux d'entre nous, dans les pays développés, qui voudraient continuer à profiter de leur confort et habitudes culturelles un peu plus longtemps devraient sans doute considérer la distribution de contraceptifs stéroïdiens à bas prix.

Dans plusieurs parties du monde, les grandes industries pharmaceutiques du monde occidental ont trouvé qu'il était plus profitable de ne vendre les contraceptifs stéroïdiens que sur ordonnance. Cette précaution n'est absolument pas justifiée

médicalement (Trussel et al. 1994), mais elle offrait discrètement aux entreprises pharmaceutiques la possibilité d'utiliser les docteurs comme vendeurs gratuitement et, en même temps, de garder des prix relativement élevés pour un produit qui n'est plus protégé par un brevet, et pouvait être fabriqué pour presque rien. La médicalisation de la contraception en dénie l'accès à ceux qui en ont le plus besoin: les pauvres, les mal informés et les adolescents du monde entier qui sont peu disposés à révéler leur sexualité naissante dans des institutions sociales et/ou religieuses qui sont potentiellement volatiles. Les corporations pharmaceutiques occidentales, motivées par le profit (Angell, 2004) n'offrent pas de solutions. Les sociétés de bienfaisance peuvent cependant, se tourner vers les industries pharmaceutiques des pays en voie de développement comme la Chine, l'Inde, l'Indonésie ou la Thaïlande.

Au Brésil, l'avortement est interdit par le gouvernement, tandis que le Brésil est un pays où la pilule du lendemain peut être achetée sans ordonnance pour un prix modique (6 à 7 Euros). Malheureusement, le nombre de personnes vivant avec moins 1 Euro/jour met l'accès à la pilule hors de portée d'une grande proportion de la population. Il est estimé que le nombre de contraceptions nécessaires, dans les pays à bas revenu, devrait passer de 498 millions en 2000 à 722 millions en 2015 (Potts et al. 2009). Une solution globale ne semble pas possible, mais nous pourrions considérer combien de personnes au monde et combien de nos habitudes culturelles pourraient être pris en compte et soutenues. Quel gouvernement va être prêt à suivre les Français qui, déjà en 2000 (Daley, 2000:1), a rendu la pilule du lendemain librement accessible aux adolescents à l'école?

A la fin du XXe siècle, les années 80 ont été considérées comme une décennie 'des occasions perdues' pour éduquer les populations à la contraception (Diczfalusy, 1991). Maintenant, au début du XXIe siècle, il est important de discuter des mesures à prendre, quelles habitudes culturelles peuvent être prises en considération et quelles solutions pourraient être mises en place afin de réduire notre impact sur l'écologie globale. Dans une analyse du coût de la réduction de gas carbonique, il a été démontré que chaque fois que l'on dépense US\$ 7 en planning familial, on peut réduire d'une tonne l'émission de gas carbonique alors que l'utilisation des technologies dites de 'basse' émission coûte au moins US\$ 32 la tonne (Wire, 2009). Il semble que l'utilisation volontaire des méthodes contraceptives soient un moyen éthique et efficace de réduire la pollution.

L'histoire a démontré que l'homme peut répéter la même erreur un incroyable nombre de fois, même si on exclut les cas d'erreur apparente ou l'intérêt général est sacrifié à celui de quelques particuliers et l'opération est soigneusement préparée d'avance. Historiquement, notre capacité de réagir pour faire face à un péril imminent laisse à désirer. L'homme a vécu dans des zones sujettes aux désastres naturels depuis des siècles, tout en étant parfaitement conscient des dangers paraissant inévitables. Les plaines inondées, les îles volcaniques, les failles, les régions d'ouragan et de tornades ont été, et sont toujours, des lieux d'habitation des hommes qui ont décidé que les bénéfices à court terme étaient préférables aux risques de catastrophes qui sont arrivées au cours de l'histoire et pourraient se présenter à nouveau dans le futur. L'histoire a démontré que les risques, bénéfices ou dangers, sont souvent mal évalués en fonction des positions géographiques retenues. Nos cerveaux se sont avérés incapables d'évaluer les dangers, du fait d'un manque d'un certain sens de prémonition.

Aujourd'hui cependant, alors que la Terre pourrait devenir rapidement le site d'une catastrophe imminente, nous commençons à montrer des signes de vouloir surmonter nos faiblesses neurologiques. Les outils de la culture, qui participent à susciter notre intuition, nous donnent aussi l'inspiration pour envisager notre propre destin. Notamment, dans le monde développé, nous commençons à discerner la naissance d'une prise de conscience plus forte; les situations et perspectives périphériques convergent vers une prise de conscience plus centrale qui entraîne une motivation plus dynamique de la société humaine. Comment pouvons-nous espérer que les populations des pays en voie de développement puissent profiter de l'expérience de nos erreurs si nous sommes, nous-mêmes, incapables d'en tirer une leçon? Si nous acceptons l'hypothèse que « Plus la population est grande, plus grandes sont les chances d'innovation » (Bloom et al. 2009), alors, nous pouvons espérer que les cultures humaines sauront s'adapter rapidement aux solutions techniques radicales que nous serons obligés de prendre.

Pendant plusieurs décennies, Paul Ehrlich (1968; 2008) a soutenu que la pression démographique sur les ressources naturelles et l'environnement est un problème contemporain qui a été ignorée par les législateurs (Bloom *et al.* 2009). Ses arguments, souvent exagérés, ont laissé des doutes chez certains. Mais il est devenu clair que le maintien de la taille de la population n'est pas un objectif valide pour les décideurs politiques (Bijak *et al.* 2005:27). Si nous voulons éviter un désastre globale en diminuant la taille de la population, des mesures socio-économiques strictes doivent être prises afin d'éviter les effets négatifs de la variation des populations et du vieillissement de la main-d'œuvre. Dans ce scénario, les législateurs devraient tenir compte de l'expérience des pays comme le Japon où la population a déjà commencé à baisser avec un indice pondéré de fécondité de 1,3 (Clark *et al.* 2008). Les projections de Bijak *et al.* (2005) pour 27 pays Européens de 2002 à 2052 ont montré que les conséquences à long terme du changement démographique devraient être traitées par les politiciens avec une préoccupation du futur qui va plus loin que la date des prochaines élections (Bijak et al. 2005:28).

Les premiers avertissements du cataclysme, prévu il y a plus de deux cents ans, donnent l'impression d'avoir pris trop longtemps à atteindre le public. Seulement le futur pourra dire si les mesures que nous avons prises l'ont été 'trop peu, trop tard'. Comme Blaise Pascal qui a mis toutes les chances de son côté même quand les causes n'avaient pas encore été déterminées ou démontrées, les législateurs qui jouent avec notre propre futur, devraient parier sur la probabilité que les émissions carboniques sont exacerbées par le surpeuplement, l'urbanisme, et la culture de consommation.



**Image 11:** La Baie de Botafogo, Rio de Janeiro, Brésil, Avril 2009.

**Remerciements:** Ces photos ont été prises lors d'une étude ethnographique sur le terrain, au Brésil, avec le soutien d'une bourse allouée par "Macquarie International Travel" et "Macquarie Research Excellence." J'exprime toute ma gratitude à Puneet Singh, à João Daniel et à la "Fondation Gregorio Mattos" pour m'avoir aidé à localiser les sites d'intérêt. Je remercie particulièrement le Professeur Roger Short, de l'Université de Melbourne, pour ses conseils et ses encouragements ainsi que pour son aide pour le voyage. Un grand merci à mon ami et mentor, Jacques Lenoir, qui m'a aidé dans mon expression de la langue française, dans ma connaissance du sujet, avec le traduction de l'article, et dans mon inclination profonde pour les Sciences. Mes remerciements chaleureux vont également à Laure Ercole pour ses conseils, Dr François Vierling pour ses corrigements et Dr Paul Klosen pour son encouragement.

**Acknowledgements:**

These photos were taken during ethnographic fieldwork in Brazil which was supported by a Macquarie International Travel Grant and a Macquarie Research Excellence Scholarship. With due gratitude to Dr Puneet Singh, João Daniel and the Fundação Gregorio Mattos for helping me locate the photo-sites, the helpful staff at the Instituto Brasileiro de Geografia e Estatística in Salvador for assisting me to collect census data and special thanks to Professor Roger V. Short, University of Melbourne, for concept, inspiration and travel assistance. Thank you also for comments and feedback from Jacques Lenoir, Laure Ercole, Dr Greg Downey, Dr Paul Klosen and Dr François Vierling.

## References

Albrecht, G.A., 2005, 'Solastalgia: A new concept in human health and identity', *PAN (Philosophy, Activism, Nature)*, 3, 41-55.

Ashraf, N., Camerer, C.F., & Loewenstein, G., 2005, 'Adam Smith, Behavioural Economist', *Journal of Economic Perspectives*, 19(3): 1-15.

Bijak, J., Kupiszewska, D., Kupiszewski, M. Saczuk, K., & Kicingier, A., 2005, 'Population and labour force projections for 27 European countries, 2002-2052: impact of international migration on population ageing', *European Journal of Population*, 23, 1-31.

de Blij, H., 2009. *The Power of Place: Geography, Destiny, and Globalization's Rough Landscape*. (New York: Oxford University Press).

Bloom, D.E, Canning, D., Fink, G., Finlay, J.E., 2009, 'Le coût de la basse fécondité en Europe (The Cost of Low Fertility in Europe)', *European Journal of Population/Revue Européenne de Démographie*, 3.

Boden, T., Marland, G., and Andres, R., 2009, *Global, Regional, and National CO2 Emission Estimates: 1751-2006*, Carbon Dioxide Information Analysis Center (CDIAC), Environmental Sciences Division, Oak Ridge National Laboratory: 2001. <http://cdiac.esd.ornl.gov/ftp/ndp030/>. Accessed: 10/07/2009.

Butler, K.D., 1998, 'Ginga Baiana—The Politics of Race, Class, Culture, and Power in Salvador, Bahia', in, Kraay, H., ed, *Afro-Brazilian Culture and Politics: Bahia, 17902 to 1990s*, M.E. Sharpe inc.

Clark, R.L., Ogawa, N., Kondo, M., & Matsukura, R., 2009, 'Population Decline, Labor Force Stability, and the Future of the Japanese Economy', *European Journal of Population/Revue Européenne de Démographie*, 3.

Collins, J.F., 2004, 'X Marks the Future of Brazil: Protestant ethics and Bedevilling Mixtures in a Brazilian Cultural Heritage Center', in, Shyrock, A., ed., *Off stage/on display: intimacy and ethnography in the age of public culture*, (Stanford University Press).

Costello A, Abbas M, Allen A, et al., 2009, 'Managing the Health Effects of Climate Change', *The Lancet*, 373, 1693-1733.

Crutz, P.J. & Stoermer, E.F., 2000, 'The "Anthropocene",' *International Geosphere-Biosphere Programme Newsletter*, 41, 17-18.

Diamond, J., 2005, *Collapse: How Societies Choose to Fail or Succeed*. (New York: Viking).

Diczfalusy E., 1991, 'Contraceptive prevalence, reproductive health and our common future', *Contraception*, 43(3):201-27.

- Djerassi, C., 1999, 'The Century of A.R.T.', in S. Griffiths, ed, *Predictions: 30 Great Minds on the Future*, (Oxford: Oxford University Press), pp.76-84.
- Ehrlich, P.R., 1968, *The Population Bomb*, (New York: Ballantine Books).
- Ehrlich, P.R., 2008, Demography and Policy: A view from outside the discipline. *Population and Development Review*, 34(1), 103-113.
- Friedman, T.L., 2005, *The World Is Flat*, (Farrar, Straus & Giroux).
- Gore, A., 2006, *An Inconvenient Truth*, (Rodale Books).
- Hogan, D.J., 1992, The impact of population growth on the physical environment. *European Journal of Population / Revue Europeenne de Demographie*, 8, 109-123.
- Knapp, G., ed., 2002, *Latin America in the Twentieth Century: Challenges and Solutions*, (Austin: University of Texas Press).
- Lovelock, J., 2006, *The Revenge of Gaia*. London, U.K.: Allen Lane.
- Mason, P.H., 2005, 'The Receiving Context: Neuroanthropology', *Traffic: Paradigm Shift*, 7, 129-147.
- Montenegro, M., 2010, 'Urban Resilience', *Seed Magazine*, 16 February.
- Nogueira, R.M.R., Miagostovich, M.P., & Schatzmayr, H.G., 2002, 'Dengue Viruses in Brazil', *Dengue Bulletin*, 26, pp. 77-83.
- Mallet, B., Lévêque, T., 2009, 'Le gouvernement temporise sur les prix de l'électricité', *Eco France Monde: La Provence*, Thomson Reuters, published 9 July 2009, accessed 13 July 2009, <http://www.laprovence.com/articles/2009/07/09/861195-Eco-France-Monde-Le-gouvernement-temporise-sur-les-prix-de-l-electricite.php>
- O'Donnell, R., 2006, 'Keynes's Principles of Writing (Innovative) Economics', *The Economic Record*, 82(259): 396-407.
- Paganelli, M.P., 2009, 'Approbatation And The Desire To Better One's Condition In Adam Smith When The Desire To Better One's Condition Does Not Better One's Condition And Society's Condition', *Journal of the History of Economic Thought*, 31(1), 79-92.
- Potts, M., Pebley, A.M., & Spiedel, J.J., 2009, *The World in 2050: A Scientific Investigation of the Impact of Global Population Growth on a Divided Planet*, Conference Statement, January 23-24, University of California, Berkeley.
- Potts, M., & Short, R.V., 1999, *Ever Since Adam and Eve: The Evolution of Human Sexuality*, (Cambridge: Cambridge University Press).

Poynter, J.R., 1969, *Society and Pauperism: English Ideas on Poor Relief, 1795-1835*, (London: Routledge & Kegan Paul, Toronto: University of Toronto Press).

Short, R.V., 1998, 'In retrospect chosen by Roger Short', *Nature*, 395, p456.

Short, Roger V.

a) 2009, 'Population Growth in Retrospect & Prospect', *Philosophical Transactions of the Royal Society of London Series B – Biological Sciences*, 364, 2971-2974.

b) 2009, 'King Canute and the Wisdom of Forest Conservation', *Nature*, 462, p567.

Smith, A., 1776, *The Wealth of Nations*, Book I, Chapter XI, Part II.

Smith, D., 2010, 'Is there an Ecological Unconscious', *The New York Times*, 27th January.

Spender, D., 1999, 'A Basic Human Right', in S. Griffiths, ed, *Predictions: 30 Great Minds on the Future*, (Oxford University Press), pp.246-255.

Teixeira, M.G., Costa, M.C.N., Guerra, Z., & Barreto, M.L. 2002, 'Dengue in Brazil: Situation – 2001 and Trends', *Dengue Bulletin*, 26, 70-76.

Trussel, J., Stewart, F., Elletson, C., Guest, F. & Potts, M., 1994, 'Efficacy implications of making the Pill available over the counter', in Samuels, S.E. & Smith, M.D., eds, *The Pill: from Presentation to Over-the-Counter*, (Menlo Park, California, U.S.A.: The Kaiser Foundation).

Wadman, M., 1999, Gore under fire in controversy over South African AIDS drug law, *Nature*, 24 June, 399, 717-718.

Wire, T (2009) *Fewer Emitters, Lower Emissions, Less Cost: Reducing future carbon emissions by investing in family planning, a cost/benefit analysis*, Masters of Science Dissertation, London School of Economics.

Instituto Brasileiro de Geografia e Estatística - IBGE. (2009) Censos Demográficos: 1872; 1890; 1900; 1920;1940; 1950; 1960; 1970; 1980; 1991; 2000; & 2008. Rio de Janeiro; Salvador da Bahia; & Brasil. <http://www.sidra.ibge.gov.br>, accessed: 23/03/2009