

**Responsibility of scientists for
balanced communication
*Forests in the landscape for wood
production and environmental care***

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Planted forests provide multiple benefits to society. People plant trees at various scales and configurations in the landscape for a variety of needs and goals. These include industrial forests, farm forests, agro-forests and a broad category of environmental plantings.

The role and value of plantation forestry- the merits and demerits- as a land use system continue to be a subject of debate. Examples include the arguments about the plantings of exotic or native species, and the potential impacts (positive and negative) of plantation forestry on other ecosystem processes including water. Informed debates are important to review, refine and improve our journey towards sustainable use of natural resources including planted forests.

In recent months the public have been subjected to an increasing flow of misinformation and questionable statements in the popular media or influential magazines with headlines about the alleged adverse effects of tree planting and man made forests on environment. These media hyperbole, creating much heat but little light, have been invariably based on some selected science reports. This raises important questions about the responsibility of scientists in communicating science to the world at large.

UK-DFID Report on Forests and Water

During the later months of 2005, the UK Department of International Development (DFID) released a much publicised report

“From *the Mountain to the Tap*”[<http://www.dfid.gov.uk/casestudies/files/research/forestry-research.asp>]. This 55 page report is based on a network of research sites which examined the impact of reforestation, as a part of the in watershed management schemes, on water resource some catchments in selected developing countries. The authors argued vigorously that several watershed management projects using “environmental forestry” have aggravated water shortages and they are a grossly misdirected use of resources. It is accepted that extensive afforestation in previously unforested catchments will reduce the water flow. However, the hydrological effects of forests are dependant on several factors including the amount and seasonal distribution of rainfall, proportion of the catchment planted with trees, location of trees, landscape features, several soil properties-and other environmental variables.

The central goal of the report, we are told, is to promote science based policies, an admirable aim for which we should strive continuously. The report is not an externally peer reviewed science document. Most of the references cited are project reports, papers in conferences some of them organised by the authors themselves and popular writings. Despite these points that are important for setting proper science standards, I do not question the scientific credibility of the research work or the well recognised record of contributors. A detailed review of the report is not my intention here.

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There is no question that we should examine catchment management programs in the light of continuously developing knowledge. Those of us contributing to the science and policies related to land use recognise the critical need for ecosystem- site -situation specific data and well interpreted knowledge and tools for assisting balanced and judicious decisions. In each case, there is the inevitable need for working out participatory trade-offs, sometimes between opposing values. Improvements and necessary changes in land use are not possible without accepting trade-offs.

It would appear that DFID and the authors are clearly planning to influence watershed management programs in developing countries through World Bank and other agencies.

My concerns about the report and media coverage are based on my view that the proponents of this report have resorted to disturbing techniques, with an evangelical fervour, to sell their message. Several statements are laced with simplistic assertions and quotes (eg “more trees are always better”) without telling us the sources to justify the authors’ advocacy. Some myths are created and some others are challenged. In some instances, unfounded but implicitly invoked relationships are stated that sensationalise the conclusions. Examples include the implied association between (1) the potential impact of reforestation on water and the excesses of the failed Suharto’s regime in Indonesia, and (2) the gross inequalities in access to water faced by the poor people and forest-water interactions. Millions of people face chronic water shortage for reasons which have nothing to do with forestry. There are questionable extrapolations of results in terms of

scale. For example, the all embracing conclusions by extrapolation from “initial results” from “field research principally in micro-watersheds” to the Indian states of Himachal Pradesh and Madhya Pradesh which represent very large and diverse land areas. The report and the statements released to the media provide flavoured statements (and muddled messages) that would feed and fuel the “spins” and “sex-ups” required by the popular magazine industry.

Thankfully there is one comfort to the foresters: we are told that “forests are not always bad, authors concede”.

Impacts of science communication

Based on the report there were subsequent one eyed, and adverse headlines about forests and forestry including: “*Down with trees*” (The Economist 30 July 2005), “*Planting trees may create deserts*” (New Scientist 29 July 2005). These are not from U.K.’s tabloid press. Such preposterous views echoed an earlier head line which I have read “*A forest Minister who wants deforestation*” (Times of India 9 June 2004). The Honourable Minister, advocated large scale deforestation as a sustainable land use and the best way to improve water supply in the state of Uttaranchal (India), a land base with fragile ecosystems situated at the base of Himalayan mountain range. This Minister is not a hydrologist and presumably some scientists must have written this spicy inaugural address for him to be delivered to a gathering of “shocked” participants at a conference.

The availability of water and its equitable distribution to all are one of the great challenges of our time. While Indian democracy may deal with a forest Minister who advocates deforestation as a sustainable land use in the Himalayan range, in January 2006 an eminent economist and the

Vice Chancellor of a reputed Indian university told in a public lecture in Canberra that “In India 90 percent of the water pumped out of hundreds of wells by farmers is wasted” and this will continue as far as they are able to pump water freely.

Late last year, I was driven by a respected forest scientist through parts of South Africa. This country has implemented a water-levy and censorial control on forestry (because trees intercept rainfall and use that water to grow wood) as a land use system. Nevertheless, we saw thousands of hectares of sugar cane fields being irrigated with overhead sprinklers in the middle of the day when high evaporative demands would ensure only a small fraction of that water fell on the crop canopy, let alone on the soil beneath it.

In the Murray-Darling Basin irrigation areas in southern Australia the amounts of precious water lost in transit and wasted during farm use are very large. Yet, thoughtless messages on the “negative hydrological effects” of planted forests are promulgated, contributing to media hyperbole (a recent example: “*Plantations may do more harm than good, says CSIRO*” ABC On line, 1 January 2006). We see large-scale abuse of water in farming and other uses around the world.

Science to support balanced policies

The contemporary ideas and practices using planted forests, retention of native vegetation including woodlands and establishment of other perennial vegetation as a part of the integrated landscape (catchment) management for wood production and ecosystem services do not advocate the type of whole scale conversion of land which forms the experimental base of most traditional forest hydrology studies. Only a mistaken few would advocate the one-size-fit all approach

severely criticised in the DFID report. In Australia for example, even in regions where industrial scale forestry plays a crucial role to support regional economy and environment, plantations cover only 2-6 percent of the land area in any given catchment.

It is important to formulate ecosystem, site and situation specific solutions. Catchment bio-geographical properties, location of the plantations and their proportional area in relation to other land uses in the landscape, their size and purpose, forest management, ecosystem services and comparative benefits to community from all aspects of land uses, and attractiveness to investments are important factors to be taken into account. Substantial progress is being made in developing tools to support judicious decisions in land use changes.

The authors of the DFID report have a case for advancing well conceived, science based and economically viable investments for watershed management. But the nature and style of their assault on forestry would not help the much needed investments in planted forests, especially in the tropical countries. Forestry can contribute much to land and water management programs by providing economic and environmental benefits.

Forests and global warming

The curtain may be rising for another drama on our stage. In a recent paper (Nature 439; 187-191, 2006) Keppler *et al* reported a discovery: several species of plants emit small quantities of methane, a greenhouse gas. This conclusion is based on some well controlled experiments and clearly warrants further careful examination. In a sequel to this paper (Nature 439; 148-149) Low went further, with no additional science or evidence, and

raised “the spectre that the new forests might increase greenhouse warming through methane emissions rather than decrease it by sequestering carbon”. This *spectre* fuelled the next step, the predictable, sensational, bold head line “*That sinking feeling: trees may rise global warming*” (Canberra Times 12 January 2006). Since then my colleagues (Polglase, Paul and Booth) have provided the first approximate analysis for Australia (<http://www.ensisjv.com/Plantations+as+carbon+sinks.aspx>). They estimated the amount of methane release from seven representative plantations across Australia using Kepler *et al* methodology and reliable productivity data from 20 diverse sites. The average annual emission of methane is equivalent to 1.2 tCO₂e/ha/year compared with a carbon sequestration rate of 25 tCO₂e/ ha/year. They point out that any negative effects of methane emission would be small probably less than 5 percent of the benefit derived from carbon sequestration. Since agricultural land also would emit methane, the net benefit of trees planted on farms on carbon sequestration would be even greater. It will take considerable amount of new work by researchers to provide a scientific base for sensible assessment of the potential impact of plant emitted methane at a global scale.

Our responsibility

I find it difficult to share fully the view aired by some scientists that they are innocent of spins and the media had “misquoted” them “out of context”. These of course are possible, but it is also becoming a tedious standard line. I have been actively engaged with media (print, radio and TV) for a long time in Australia and in other countries. It is my experience (shared by other colleagues also) that if our pronouncements do not overstate the messages, one way or another, and if we are deeply aware of the uncertainties and limitations of our science, it is possible to get across sensible information in interesting ways to inform the community through the media.

Science based policies are not advanced by negatively portraying forestry as a land use system which uses all the water, causing drought (ignoring the knowledge from climate science) and emitting methane which further warms up the globe.

We should reflect on what and how we communicate science to the diverse world to promote informed discussions and balanced outcomes for economic and environmental benefits to society. This is increasingly important to enable us to serve society through science.