ScienceWatch Home
Interviews

Featured Interviews
Author Commentaries
Institutional Interviews
Journal Interviews
Podcasts

Analyses

Featured Analyses
What's Hot In...
Special Topics

Data & Rankings

Sci-Bytes
Fast Breaking Papers
New Hot Papers
Emerging Research Fronts
Fast Moving Fronts
Research Front Maps
Current Classics
Top Topics
Rising Stars
New Entrants
Country Profiles

About Science Watch

Methodology
Archives
Contact Us
RSS Feeds

EMERGING RESEARCH FRONTS - 2008

August 2008

PDF

Sampurno Bruijnzeel talks with *ScienceWatch.com* and answers a few questions about this month's Emerging Research Front Paper in the field of Engineering. The author has also sent along images of their work.

Article: Hydrological functions of tropical forests: not seeing the soil for the trees?
Authors: Bruijnzeel, LA
Journal: AGR ECOSYST ENVIRON, 104 (1): 185-228 SEP 2004
Addresses: Free Univ Amsterdam, Fac Earth & Life Sci, Boelelaan 1085-1087, NL-1081 HV Amsterdam, Netherlands.
Free Univ Amsterdam, Fac Earth & Life Sci, NL-1081 HV Amsterdam, Netherlands.

+ Enlarge

SW: Why do you think your paper is highly cited?

To begin with, the paper received a flying start by being highly cited in the widely read *Polex Newsletter* issued by the International Centre for Forestry Research (CIFOR). This newsletter reaches an audience representing many more disciplines than the journal in which the paper itself was published at the time (*Agriculture, Ecosystems and Environment*).

In addition, there has been so much debate on the hydrological role of (tropical) forest in recent years that many people have become confused and simply do not know what to believe anymore. The issue is rather complex indeed, in that the effect of deforestation or reforestration on streamflow depends on the local setting in terms of rainfall, soils, and topography and therefore one-liners are not good enough. I like to believe that the paper has succeeded in striking the right balance in terms of complexity and nuance, and this seems to appeal to many readers (from what I've heard).

Figure 1: +details

Figure 2:

SW: Does it describe a new discovery, methodology, or synthesis of knowledge?

It is primarily a synthesis of knowledge on a topic (tropical forests and water) that is both subject to heated debate and is also confusing to many.

SW: How did you become involved in this research and were any particular problems encountered along the way?

I went to Indonesia as a student in the mid-'70s to study forest hydrology and gradually got more and more interested in the hydrological impacts of land-cover change (deforestration, reforestration) in addition to the study of the hydrological functioning of forest ecosystems themselves.

Written for a review such as *Agriculture, Ecosystems & Environment,* my 2004 paper has also been helpful in identifying the chief subjects requiring further research and the extent to which the hydrology of degraded lands can be restored again. Examples include the hydrology of tropical montane cloud forests, a rare type of evergreen mountain forest found in tropical areas where local climatic conditions cause cloud and mist to be regularly in contact with the forest vegetation. These forests are receiving additional water inputs through cloud water capture—a most elusive and difficult to quantify process.

Figure 3:

SW: Where do you see your research leading in the future?

Given the ongoing degradation of many areas in the humid and sub-humid tropics and the surprising lack of good quantitative information on the hydrological functioning of such degraded areas, I reckon there is an urgent need to fill this lacuna.

In addition, with an increased emphasis lately on planting trees for the mitigation of climate change, resulting in an increase in carbon sequestration—usually without realizing the potentially adverse effects on streamflow—efforts to quantify the hydrological implications of all this tree planting need to be stepped up.

Finally, the hydrological implications of restoring badly degraded land under a range of tropical climatic conditions constitute a major research challenge for years to come.

SW: Do you foresee any social or political implications for your research?

Yes, for instance, the planned massive tree planting schemes (for carbon sequestration, etc.) in sub-humid areas that do not support natural forest (e.g., East Africa) are bound to backfire on the situation of water availability.

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Keywords: hydrological functions, tropical forests, deforestation, reforestration, streamflow, rainfall, soils, topography, hydrology of tropical montane cloud forests, hydrological functioning of forest ecosystems, cloud water capture, tree planting schemes.

PDF

back to top

2008 : August 2008 : Sampurno Bruijnzeel

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Return to interview.

Figures and descriptions:

Figure 1:

Figure 1:
Sumatra baseflow: Old-growth forests like this in western Sumatra typically provide stable streamflows of high quality.

View larger image (allow time to load). Close new browser window to return to this page.

Figure 2:

Figure 2:
Fiji pines: Planting fast-growing trees in areas supporting natural grassland vegetation is bound to lead to strong reductions in streamflow (Viti Levu, Fiji).

View larger image (allow time to load). Close new browser window to return to this page.

Figure 3:

Figure 3:
E38: The hydrology of strongly degraded areas like this example from Java (Indonesia) may well be improved by regreening the landscape. Little is known however to what extent this may be achieved.

View larger image (allow time to load). Close new browser window to return to this page.

Return to interview.

back to top