

[Printer-friendly version](#) [1][PDF version](#) [2]

- [Twitter](#) [3]
- [Google+](#) [4]
- [Facebook](#) [5]
- [LinkedIn](#) [6]
- [Digg](#) [7]
- [del.icio.us](#) [8]
- [StumbleUpon](#) [9]

# Influence of coastal vegetation on the 2004 tsunami wave impact in west Aceh

Resource  
July 2011

## Themes

- [10]

[capture\\_pnas.png](#) [11]



## PDF



[12]

Filename: tsunami\_and\_coastal\_veg.pdf

Size: 1.19 MB

## Summary

In a tsunami event human casualties and infrastructure damage are determined predominantly by seaquake intensity and offshore properties. On land, wave energy is attenuated by gravitation (elevation) and friction (land cover). Tree belts have been promoted as “bioshields” against wave impact. However, given the lack of quantitative evidence of their performance in such extreme events, tree belts have been criticized for creating a false sense of security. This study used 180 transects perpendicular to over 100 km on the west coast of Aceh, Indonesia to analyze the influence of coastal vegetation, particularly cultivated trees, on the impact of the 2004 tsunami. Satellite imagery; land cover maps; land use characteristics; stem diameter, height, and planting density; and a literature review were used to develop a land cover roughness coefficient accounting for the resistance offered by different land uses to the wave advance. Applying a spatial generalized linear mixed model, we found that while distance to coast was the dominant determinant of impact (casualties and infrastructure damage), the existing coastal vegetation in front of settlements also significantly reduced casualties by an average of 5%. In contrast, dense vegetation behind villages endangered human lives and increased structural damage. Debris carried by the backwash may have contributed to these dissimilar effects of land cover. For sustainable and effective coastal risk management, location of settlements is essential, while the protective potential of coastal vegetation, as determined by its spatial arrangement, should be regarded as an important livelihood provider rather than just as a bioshield.

## Authors

Bayas, Juan Carlos Laso

Marohn, Carsten

Dercon, Gerd

Dewi, Sonya

Piepho, Hans Peter

Joshi, Laxman

van Noordwijk, Meine

Cadisich, Georg

## Journal

Proceedings of the National Academy of Sciences of the United States of America

## Editors

Clark, William C.

## Search resources

Search

Apply

Reset

## Other resources

- [Forest Ecosystems in the transition to a green economy and the role of REDD+ in the United Republic of Tanzania](#) [13]
- [To what extent does the presence of forests and trees contribute to food production in humid and dry forest landscapes?: a systematic review protocol](#) [14]
- [Does production of oil palm, soybean, or jatropha change biodiversity and ecosystem functions in tropical forests](#) [15]
- [Environmental and socio-economic consequences of forest carbon payments in Bolivia: Results of the OSIRIS-Bolivia model \(en Español\)](#) [16]
- [Forest Conservation and Management in the Anthropocene: Adaptation of Science, Policy, and Practices](#) [17]
- [REDD+ and Biodiversity Conservation: Approaches, Experiences and Opportunities for Improved Outcomes](#) [18]
- [The Protection of Forests under Global Biodiversity and Climate Policies - Policy Options and Case Studies on Greening REDD+](#) [19]
- [Learning from 20 years of Payments for Ecosystem Services in Costa Rica](#) [20]
- [Participatory Biodiversity Monitoring for REDD+. Considerations for national REDD+ programmes](#) [21]
- [Mapping the potential for REDD+ to deliver biodiversity conservation in Viet Nam. A preliminary analysis](#) [22]

---

### Source URL:

<http://theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh>

### Links

[1] <http://theredddesk.org/print/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh>

[2] <http://theredddesk.org/printpdf/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh>

[3] <http://twitter.com/share?url=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh&text=Influence%20of%20coastal%20vegetation%20on%20the%202004%20tsunami%20wave%20impact%20in%20west%20Aceh>

[4] <https://plus.google.com/share?url=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh>

[5] <http://www.facebook.com/sharer.php?u=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh&t=Influence%20of%20coastal%20vegetation%20on%20the%202004%20tsunami%20wave%20impact%20in%20west%20Aceh>

- [6] <http://www.linkedin.com/shareArticle?mini=true&url=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh&title=Influence%20of%20coastal%20vegetation%20on%20the%202004%20tsunami%20wave%20impact%20in%20west%20Aceh&summary=&source=The%20REDD%20Desk>
- [7] <http://digg.com/submit?phase=2&url=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh&title=Influence%20of%20coastal%20vegetation%20on%20the%202004%20tsunami%20wave%20impact%20in%20west%20Aceh>
- [8] <http://del.icio.us/post?url=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh&title=Influence%20of%20coastal%20vegetation%20on%20the%202004%20tsunami%20wave%20impact%20in%20west%20Aceh>
- [9] <http://www.stumbleupon.com/submit?url=http%3A//theredddesk.org/resources/influence-coastal-vegetation-2004-tsunami-wave-impact-west-aceh&title=Influence%20of%20coastal%20vegetation%20on%20the%202004%20tsunami%20wave%20impact%20in%20west%20Aceh>
- [10] <http://theredddesk.org/taxonomy/term>
- [11] <http://theredddesk.org/file/capturepnas.png>
- [12] [http://theredddesk.org/sites/default/files/resources/pdf/2012/tsunami\\_and\\_coastal\\_veg.pdf](http://theredddesk.org/sites/default/files/resources/pdf/2012/tsunami_and_coastal_veg.pdf)
- [13] <http://theredddesk.org/resources/forest-ecosystems-transition-green-economy-and-role-redd-united-republic-tanzania>
- [14] <http://theredddesk.org/resources/what-extent-does-presence-forests-and-trees-contribute-food-production-humid-and-dry>
- [15] <http://theredddesk.org/resources/does-production-oil-palm-soybean-or-jatropha-change-biodiversity-and-ecosystem-functions>
- [16] <http://theredddesk.org/resources/environmental-and-socio-economic-consequences-forest-carbon-payments-bolivia-results>
- [17] <http://theredddesk.org/resources/forest-conservation-and-management-anthropocene-adaptation-science-policy-and-practices>
- [18] <http://theredddesk.org/resources/redd-and-biodiversity-conservation-approaches-experiences-and-opportunities-improved>
- [19] <http://theredddesk.org/resources/protection-forests-under-global-biodiversity-and-climate-policies-policy-options-and-case>
- [20] <http://theredddesk.org/resources/learning-20-years-payments-ecosystem-services-costa-rica>
- [21]

<http://theredddesk.org/resources/participatory-biodiversity-monitoring-redd-considerations-national-redd-programmes>

[22]

<http://theredddesk.org/resources/mapping-potential-redd-deliver-biodiversity-conservation-viet-nam-preliminary-analysis>