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on Natural Sciences (ICONS) 2011**

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## FOREWORD

The First International Conference on Natural Sciences, July 9-11, 2011 in Batu, East Java, Indonesia, brought together scientists from nine countries from South-East Asia, Germany and Japan. South-East Asia is extremely rich in natural resources, many of them still untapped, but has also extremely densely populated areas that have to cope with the ensuing problems including infrastructure measures, intensive agri- and aquaculture, waste management, and nature preservation. Study, use and development of existing resources and coping with the aforementioned problems, requires interdisciplinary cooperation. Based on a network of Alexander von Humboldt alumni, the conference aimed at linking the wide professional expertise, at making the best use of existing equipment and pinpointing gaps, and at integrating basic and applied research.

This book is a mosaic of the impressive oral and poster presentations of the conference. It reflects the scientific diversity, existing contacts, and areas of promising new joint ventures. Editing such a wide scope of subjects was fascinating and challenging, allowing at the same time to reflect the many discussions during the meeting that encompassed a world of science. We trust that the book may serve a similar function among the participants, as well as for a wider scope of readers.

Thanks to all who contributed: Irfan Tri Raharjo as coordinator, our co-editors helping to review the submissions, the Alexander von Humboldt Foundation who gave financial and logistic support, and, last but not least, the Rector, Leenawaty Limantara, and the staff of Ma Chung University who had already organized the meeting so well and now relieved us of many formal and administrative tasks involved in making the book.

May this seed grow and bear rich fruit!

Malang, 15 March 2012

**Hugo Scheer**

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## VORWORT

Die "First International Conference on Natural Sciences" brachte vom 9.-11. Juli 2011 Wissenschaftler aus neun Ländern Südostasiens, Deutschland und Japan nach Batu in Ost-Java, Indonesien. Südostasien ist außergewöhnlich reich an natürlichen Ressourcen, von denen noch viele unangetastet sind. Es hat gleichzeitig außerordentlich dicht bevölkerte Gebiete, in denen die daraus erwachsenden Probleme der Infrastruktur, der intensiven Landwirtschaft und Aquakultur, und des Naturschutzes gelöst werden müssen. Exploration, Nutzung und Entwicklung der vielfältigen Ressourcen und die Lösung der häufig konflikträchtigen Probleme ist nur durch interdisziplinäre Kooperationen möglich. Es war das Ziel dieser Konferenz, auf der Basis eines Netzwerks "Südostasien" der Alexander von Humboldt Alumni einschlägige Erfahrungen zu bündeln, vorhandene technische Ausrüstung Labor-übergreifend zu nutzen, Lücken zu definieren, und Wissenschaftler aus der Grundlagenforschung und aus technologischen Anwendungen zusammenzuführen.

Das vorliegende Buch gibt, als ein Mosaik, die thematisch breit gefächerten und beeindruckenden Vorträge und Poster wieder, die auf der Konferenz vorgestellt wurden. Es zeigt die Vielfalt der Forschung, bereits bestehende Kontakte, und Möglichkeiten zu neuen Kooperationen. Die Herausgabe eines solch weiten Spektrums von Arbeiten war zugleich beeindruckend und fordernd, es gab uns gleichzeitig die Gelegenheit, noch einmal die vielen Diskussionen zu erinnern, die eine Welt der Wissenschaft umfassten. Wir hoffen, dass dieses Buch bei allen Teilnehmern diese Funktion erfüllen wird, und die Themen und Teilnehmer einem weiteren Kreis von Lesern nahebringt.

Wir danken allen Beteiligten: Irfan Tri Raharjo für die Koordination des Buches, den Mitherausgebern für die kritische Durchsicht und Kommentierung der Manuskripte, der Alexander von Humboldt Stiftung für finanzielle und logistische Unterstützung. Nicht zuletzt danken wir der Rektorin der Ma Chung Universität, Leenawaty Limantara, und ihren Mitarbeitern; nach der ausgezeichneten Organisation der Konferenz haben sie uns durch Entlastung von vielen formalen und administrativen Aufgaben auch die Herausgabe dieses Buches leicht gemacht.

Möge dieses Samenkorn gut anwachsen und reiche Ernte bringen!

Malang, 15. März 2012

**Hugo Scheer**

*der Chefredakteur*

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# *Messages*



## **MESSAGE FROM THE SECRETARY GENERAL OF THE ALEXANDER VON HUMBOLDT FOUNDATION**

### ***Contribution of the Humboldt Foundation to the “Proceedings” on the occasion of the Humboldt Kolleg in Indonesia in 2011***

Knowledge creates development – this is not only the case in developing and emerging countries, but in industrialized countries, too. The major issues in areas like resource conservation, global warming, sustainable energy supplies and healthcare, as well as access to water can only be tackled jointly, which means across both borders and disciplines. The key to this are highly-qualified academics in the natural sciences and engineering as well as in the humanities and social sciences. By selecting and promoting the best researchers and creating and developing self-supporting networks the Alexander von Humboldt Foundation has set itself the task of making a significant contribution to development and thus to the improvement of living conditions. It does not base its selection on country, subject, religious belief or gender, but purely on academic eligibility. The Foundation sponsors individuals involved in both applied and basic research. The best chance of successfully addressing the problem areas described above lies in precisely this complementarity.

Good research results alone are not enough. What is crucial is whether they have been achieved in different cultural contexts, are introduced into different social contexts and have a long-term impact when they are implemented. Mutual trust is required if this is to be achieved. For this reason, the Alexander von Humboldt Foundation places great emphasis on engendering trust: the academics it sponsors and their families are embedded in a culture of mentoring and counseling not only during their stay in Germany but also after their return to their own countries. The foundation provides platforms for cross-disciplinary, cross-border networking; it offers its alumni a whole range of sponsoring opportunities that allow them to continue the research projects they have started in Germany in their own countries.

It is important to keep upgrading the portfolio of programmes. To this end, the Alexander von Humboldt Foundation regularly organizes round-table discussions with fellows, alumni and their hosts in order to tailor their programmes to genuine needs. The International Climate Protection Fellowships, which were introduced recently, are one example of this process. They seek to address the global challenge of climate change in the context of cross-border, international cooperation. Up to 20 of these fellowships are available every year for potential leaders from non-European emerging and developing countries in the field of climate protection and resource conservation.

The first Humboldt Kolleg in Indonesia under the heading “Synergy, Networking and the Role of Fundamental Research Development in ASEAN”, together with the International Conference on Natural Sciences (ICONS 2011) and the research results that were presented and discussed there, constitute an important response to surmounting cross-border challenges.

**Dr. Klaus Manderla**

*Head of Division for Asia  
Alexander von Humboldt Foundation*

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**MESSAGE FROM THE CHAIRWOMAN  
OF HUMBOLDT KOLLEG IN CONJUNCTION WITH ICONS 2011**

*Welcome to Humboldt Kolleg Synergy, Networking and the Role of Fundamental Research Development in South-East Asia in conjunction with the International Conference on Natural Sciences 2011*

The year 2011 is a monumental year for the Humboldt Fellow Indonesia for the success of the first Humboldt Kolleg in Indonesia which was held in conjunction with the International Conference on Natural Sciences 2011. Owing to the excellent cooperation between Humboldt Club Indonesia under the leadership of Dr. L. T. Handoko and Ma Chung University, the program was successfully and officially opened on 8<sup>th</sup> July, 2011 (for Humboldt fellows) and on 9<sup>th</sup> July, 2011 (for public). The program intended for Humboldt fellows, academics, and scientists from South-East Asia, was created in the form of a plenary lecture, invited lectures, oral presentations, a poster session, and an excursion to Mount Bromo in East-Java. The program consisted of four themes: (1) the role of natural sciences in conserving natural resources, (2) the role of natural sciences in overcoming global warming, (3) the role of natural sciences in developing science and technology, and (4) the role of natural sciences in improving human welfare. Through the three-day activities, three outcomes could be secured: (1) two conference proceedings to be published by Shaker-Verlag, Germany, and an Indonesian publisher; (2) a book entitled *Humboldtians in South-East Asia: Research Interests and Future Prospects*, and (3) the declaration of Malang Humboldt Resolution. Humboldt Kolleg I in Indonesia was attended by 23 Humboldt fellows from the 55 Humboldt Fellows invited, and 129 researchers and academics representing Germany, Japan, Indonesia, Singapore, the Philippines, Malaysia, Korea, and Vietnam.

The proceedings book was created to compile all the International Conference on Natural Sciences (ICONS) activities held as a single unit of activities of the first Humboldt Kolleg in Indonesia. In practice, several writers withdrew their articles because their articles were successfully published in national and international journals so that they are not mentioned in the proceedings.

We sincerely hope that this book can be used as a scientific reference for many scholars.

Malang, 15 March 2012

**Leenawaty Limantara**

*Chairperson*

*Humboldt Kolleg in conjunction with ICONS 2011*



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