

10 YEARS SPIN: LOOKING AHEAD, LOOKING BACK



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LOOKING AHEAD, LOOKING BACK**

Royal Netherlands Academy of Arts and Sciences
June 2012

PREFACE

It is with great pride that the Royal Netherlands Academy of Arts and Sciences (KNAW), together with the Dutch Ministry of Education, Culture and Science (OCW) and the Netherlands Organisation for Scientific Research (NWO), presents this booklet on the Scientific Programme Indonesia – Netherlands (SPIN). This publication marks the ending of the research projects of SPIN 2 (2006-2011) and the start of the new SPIN Joint Research Projects (2012-2016).

This gives the opportunity to look back and look ahead. The booklet first provides an insight in the history and guiding principles of SPIN. It introduces the various past and present programmes operating within SPIN, and describes the role of the Joint Working Committee Indonesia-The Netherlands. The second part, based on interviews with Indonesian and Dutch researchers, presents a flavour of the scientific practice, impact and results of SPIN. For more information on these and other past projects, please visit the website www.knaw.nl/indonesia. Finally, the SPIN projects for the immediate future introduce their plans and share the scientific challenges they want to tackle during the next five years.

The principle partners in SPIN, KNAW and NWO, and the Ministry of OCW which provides the budget, take great pride in the fact that SPIN succeeds in reaching its goals: training new generations of researchers, as well as producing scientific results of high quality. A steady stream of Dutch and Indonesian PhD theses has emerged from the programme and a large number of articles, books and other publications have resulted from the SPIN research projects.

SPIN is based on shared focus and mutual respect. We express our gratitude to the Indonesian partners for their contribution to our joint activities. Institutional support, active policy adjustments and matching funding from Indonesia show that the basis of our scientific relationship is robust and sustainable. SPIN will remain a key factor in our joint scientific ambitions.

Jos W.M. van der Meer
Chairman, SPIN committee
Royal Netherlands Academy of
Arts and Sciences



Babs van den Bergh
Director Research and Science Policy
Ministry of Education, Culture and Science



Ministry of Education, Culture and
Science

Renée van Kessel
Director, NWO WOTRO
Science for Global Development



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INTRODUCTION

Indonesia is one of the rising giants of Asia. It is the world's fourth largest country, with a population of 240 million, and has the largest number of Muslims. Its booming economy has elevated it to G20 status, an achievement that it has twinned with a successful transition to democracy. Indeed, Indonesia has been hailed as having 'a good chance of becoming the world's first Muslim and democratic superpower' (*Foreign Policy*, December 2010). Due to its biological diversity and geological and tectonic location on the Pacific Ring of Fire, Indonesia is also of major importance for the survival of the human species. The Netherlands is fortunate to have a long and special relationship with Indonesia.

History

Indonesia and the Netherlands share a centuries-long and fertile history of scientific cooperation. The scientific links between them go back a long way, to colonial times. Prominent Indonesian institutions such as the Eijkman Institute, Bandung Technical College (ITB), the College of Law, and the College of Medicine (now Universitas Indonesia) date from that period. On the Dutch side, venerable institutions such as the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV), the Royal Tropical Institute (KIT) and the Van Vollenhoven Institute are similarly rooted in a combination of colonial training and practice as well as scientific curiosity and methodology.

In a recent newspaper column, Royal Academy president Robbert Dijkgraaf reminded us of the immense benefits that Dutch science has derived from the Netherlands' historical relationship with Indonesia, Christiaan Eijkman's Nobel Prize (for his discovery of vitamins, 1929) being just one example. Commenting on the present-day importance of Indonesia, he observed: 'The greatest natural riches of this large archipelago in 2012 are neither spices nor cheap labour but rather its endless source

of youthful talent.' (Robbert Dijkgraaf, Royal Academy President 2008-2012, *NRC Handelsblad*, 18 February 2012)

Colonial institutions and traditions left important artefacts for science in Indonesia. Their rediscovery and reinvention by present-day Indonesian scientists, as in the case of the Eijkman Institute, has proven beneficial to Indonesian science meeting the challenges of modern Indonesia.

Sangkot Marzuki, President of the Indonesian Academy of Sciences

Indonesia and the Netherlands are of interest to each other because of their shared history, which is documented in irreplaceable archives, wide-ranging collections, extensive sources and data available in both countries. International cooperation has provided ample mutual access to international scientific research communities, sources and infrastructure, and such access has proved indispensable both in identifying knowledge gaps and in formulating scientific hypotheses in both countries. Joint research in agriculture, bio-based economy, biodiversity, coastal and marine issues, infectious diseases, socio-economic developments and global change are important not only for Indonesia and the Netherlands but for the world at large. By capitalizing on the time-honoured existing networks of exchange, cooperation and mutual trust, and by setting up new research groups, Indonesia and the Netherlands are now in a position to take further advantage of the resources – scientific, human, natural and otherwise – available in both countries.

Institutional framework

A long tradition of collaboration between the Netherlands and Indonesia, renewed by means of the Cultural Agreement of 7 July 1968, was reconfirmed in 1992 when the countries signed two Memorandums of Understanding (MoU). One was between the Dutch Minister of Education and Science and the Indonesian Minister of Research and Technology and expressed the wish to extend collaboration in the field of science, research and technology in the mutual interest of the two countries, and to intensify such collaboration by involving research institutes, institutions of higher education, and public and private enterprise. The other MoU, between the Dutch Minister of Education and Science and the Indonesian Minister of Education and Culture, was aimed at improving the overall opportunities for educational and scientific collaboration and exchanges.

At the time, scientific cooperation was fragmented, both among individual researchers and between university departments. The Dutch Ministry implemented two scientific advisory committees, one for Science, Technology and Medicine and another for Culture and Society. It also established a steering committee to better organize these varied activities. Nevertheless, available funding was distributed

mainly to smaller-scale cooperative research efforts and individual PhD projects. The range of these projects was impressive and covered the full breadth of science, from architecture, dance and literature to dengue fever, sea turtles and port development, and from dictionaries and phonetics to laser photo-acoustics and mathematical wave modelling.

The birth of SPIN

In 1995, the Minister of Education, Culture and Science decided to transfer responsibility for the collaboration programmes with Indonesia to the Royal Netherlands Academy of Arts and Sciences (KNAW). Not long after, in 1997, a decision was taken to change the focus of collaboration. The main objective remained the same: ‘To promote long-term scientific collaboration between research groups in both countries by entering into bilateral research programmes based on the principles of reciprocity and mutual interest’. Within the new structure, research programmes were to be arranged that would consist of a set of logically associated research and support activities, whereas collaboration had in the past involved unrelated projects without much in the way of cohesion. The new programmes were to be developed and implemented by institutes or research groups from both countries with experience in a particular research field. The *Scientific Programme Indonesia–Netherlands* (SPIN) was thus instituted and in 2000 the first priority programmes commenced. The new line was reconfirmed and grounded in a new MoU in 2002.

Joint Working Committee

Ever since 2003, the prime strategic vehicle of SPIN cooperation has been the Joint Working Committee (JWC). Its members represent science, the universities and other educators, the research funding agencies and agencies intent on engaging science and society through valorisation. The Joint Working Committee’s primary objective is to encourage and improve cooperation in science and technology between Indonesia and the Netherlands. The Committee’s key task is to identify common priority areas and specific topics. It aims to concentrate scientific focus and critical mass and to foster human and organisational capacity-building.

The JWC members explore multilateral alliances by participating in international networks. The Royal Academy and the Indonesian Ministry of Research and Technology participate in a multilateral EU-funded network programme entitled SEA-EU-NET, Facilitating the Bi-regional Science and Technology Policy Dialogue between Southeast Asia and Europe. Seventeen EU and ASEAN member states participate in this programme, which aims to improve bi-regional dialogue on scientific cooperation. The programme also seeks to increase Southeast Asian participation in EU Framework Programmes.

Over the past decades, Indonesia has defined scientific themes and challenges that should receive priority in scholarly attention and funding. RISTEK is pleased to note that many of the themes pursued within the SPIN collaboration meet the national scientific agenda to strengthen the National and Regional Innovation System in Indonesia. The concerted effort of Indonesian and Dutch scientists within SPIN is helping Indonesia to create knowledge-based solutions to scientific as well as societal challenges.

Indonesian State Minister of Research and Technology (RISTEK),
Prof. H. Gusti Muhammad Hatta, MS

SEA-EU-NET has been running since early 2008 and brings together nine Southeast Asian and thirteen European institutions. Its objective is to increase the quality, quantity, profile and impact of bi-regional S&T cooperation between ASEAN and Europe. Following this mandate, the project supports networking in both research areas through policy dialogue, thematic workshops and networking events. It has increased the information flow to scientists on the ground and explored opportunities for collaboration between scientists.

SPIN aims

SPIN capitalises on existing networks between the two countries. It allows Indonesia and the Netherlands to take advantage of the scientific, human, natural and other resources available in both countries and to maintain and set up new research networks. The programme adheres to the principles of reciprocity and mutual benefit. Its aims are:

- to promote long-term cooperation between Indonesian and Dutch research groups;
- to prevent fragmentation in scientific pursuit;
- to work efficiently, collaboratively and with focus on building critical scientific mass;
- to help foster scientific curiosity and academic scholarship in Indonesia;
- to create public awareness and recognition of the importance of basic and strategic science in Indonesian and Dutch society;
- to promote the education and training of new generations of Indonesian and Dutch scientists to carry cooperative networks into the future.

In order to help develop and consolidate multidisciplinary knowledge networks in the Netherlands focusing on Indonesia, SPIN is coordinated by a joint programme committee of the Royal Netherlands Academy of Arts and Sciences and the Netherlands Organisation for Scientific Research (NWO).

Naturally, scientific collaboration goes much further than bilateral agreements. In fact, it involves a complex network of individual and institutional relationships between professors and students and between faculties and universities, a network sustained by seminars, study grants, joint research and publications. Two joint programmes that exemplify this were made possible through combined funding by

SPIN and NWO (through the Netherlands Foundation for the Advancement of Tropical Research, which is now WOTRO Science for Global Development):

- the East Kalimantan Programme: an integrated multi-disciplinary programme including ecological, social and marine biological approaches (see page 37);
- the Agriculture beyond Food Programme: a programme which looks at socio-political, socio-economic, ecological and chemical-technological aspects of biofuel production in Indonesia (see page 41).

SPIN results

Cutting-edge scientific research of major strategic and societal importance for both Indonesia and the Netherlands is the main aim of the SPIN programme. Equal and complementary contributions from both countries are essential for research conducted within SPIN.

Throughout its existence, SPIN has implemented sub-programmes targeting different segments, forms and stages of scientific cooperation. These included the **Mobility Programme**, which helped senior researchers who wished to enter into new partnerships and jointly execute small research projects. The aim of the **Priority Programmes** was to establish integrated projects. Though not a primary goal, these projects not only produced Indonesian and Dutch PhDs steeped in their discipline under the supervision of Indonesian and Dutch senior researchers, but also embedded them in strong networks and a practice of cooperation with their peers. Finally, young Indonesian scientists who had successfully obtained their PhD were given the opportunity to expand their research skills and international experience through the individual **Post-doc Programme**.

SPIN started in 2002 with five Priority Programmes comprising a total number of 25 research projects: Indonesia in Transition (4 projects), Islam in Indonesia (4 projects), Infectious Diseases (5 projects), Biotechnology Research Indonesia the Netherlands (6 projects) and Applied Mathematics (6 projects). Later two more themes were added to the priority programmes, i.e. Legal Research Co-operation (2 projects), and a Pilot Programme for Coastal Zone Research, which produced the East Kalimantan Programme. The second phase of SPIN (commencing in 2005) saw the introduction of four integrated priority programmes.

While every call for proposals fostered new partnerships and institutional networks, it is encouraging to see that enduring relationships and careers have developed on both the Dutch and the Indonesian side. SPIN has enabled young scholars from both countries to build a career, some of the best and brightest even spanning the full gamut from PhD candidate to senior applicant responsible for an integrated priority programme. It proves that Indonesian-Dutch scientific cooperation has been very successful in nurturing human capital and expertise.

Joint scientific publications by authors involved in medical and natural science SPIN projects have appeared in internationally renowned journals such as *Science*, *The Lancet*, *Nature*, and the *Journal of the American Medical Association*, bearing witness



A floating house at the mouth of Ohong river. Photo: Edwin de Jong

to the programme's successful formula. Equally, social science projects have produced high-impact articles in leading journals and pioneering monographs and edited volumes. More than 600 Indonesian and Dutch researchers, post-docs and PhD students are involved in SPIN at any given time; each five-year cycle yields an output of more than 350 articles in international peer-reviewed scientific periodicals, books and other publications, as well as numerous presentations at scientific conferences.

Building on its success, networks and internationally relevant, long-term thematic priorities, SPIN boosts the effects of scientific cooperation, focusing on the needs of both countries and contributing to the resolution of international societal and scientific challenges.

Academy Professorship Indonesia

Through their partnership in SPIN, the Royal Academy and the Indonesian Academy of Sciences (AIPI) explored the possibility of installing academy-funded rotating professorships at Indonesian universities, to be held by eminent Indonesian scientists. Subsequently designated the **Academy Professorship Indonesia**, this initiative was first

proposed by the Royal Netherlands Institute of Southeast Asian and Caribbean Studies (KITLV) in Jakarta in 2004 and embraced by both academies. The academies use these special appointments to strengthen the position of the sciences and arts in Indonesia, to foster scientific curiosity and an academic culture, and to raise awareness in society of the importance of science to the Indonesian community. An international committee of experts selects the candidates for these prestigious positions; the host university is likewise carefully chosen. KITLV Jakarta plays an indispensable role in coordinating the procedure.

The Academy Professorship Indonesia was officially launched in February 2007 at Gadjah Mada University in Yogyakarta, when Dr Yunita Winarto was inaugurated as the first Academy Professor in the Social Sciences. In December 2011, at Hasanuddin University of Makassar, Dr David Handojo Muljono was inaugurated as the Academy Professor Indonesia in the Life Sciences.

Open Science Meetings

The tradition of the Open Science Meetings (OSMs) began in 2002, when Indonesia and the Netherlands reconfirmed their long history of scientific cooperation. The events bring together scientists from Indonesia and the Netherlands (and increasingly from many other countries) to present findings emanating from and to discuss issues pertaining to scientific work on SPIN-related themes. Six OSMs have been organised so far by various Indonesian and Dutch institutions under the auspices of the Joint Working Committee. Each one has been innovative and addressed topical themes of mutual interest to the two countries. Recurring themes include synergies between differing disciplines (notably the social and natural sciences) and between science and society. Universities, research institutions and both academies have played an active part in organizing the OSMs.

The Sixth Open Science Meeting, entitled Rise to the Water Challenge, took place in Jakarta, Indonesia on 28–29 November 2011. An international scientific forum was brought together to present comparative cases and practices from Indonesia and elsewhere. The meeting considered changes in water systems affecting biomass and ecosystems, public health and social and economic development. This issue transcends the Indonesian-Dutch partnership, impacting Earth at large. The Inter Academy Council (IAC) considers that the security, stability, and environmental sustainability of all nations, particularly those in the developing world, are threatened by natural and human-induced changes in regional water systems and the water resources they provide. In conjunction with the OSM's in 2009 and 2011, workshops for Indonesian Master and PhD students on selected topics have been organised at several universities (in 2009 in the Netherlands and in 2011 in Indonesia).

Past Open Science Meetings:

- OSM 2011: Rise to the Water Challenge, November 2011, Jakarta, Indonesia;
- OSM 2009: Science, Innovation and Valorisation: Bridging the Gap between Science, Market and Society, November 2009, Amsterdam, the Netherlands;
- OSM 2007: Towards a Sustainable World, November 2007, Bali, Indonesia;
- OSM 2005: Science and Society: New Challenges and Opportunities, September 2005, Yogyakarta, Indonesia;
- OSM 2003: Back to the Future, September 2003, Jakarta, Indonesia; and
- OSM 2002: Scientific Programme Indonesia Netherlands, February 2002, Bandung, Indonesia

The future of SPIN: the third cycle, 2012-2016

Bilateral scientific cooperation between Indonesia and the Netherlands within SPIN coincided with a change in science policy in Indonesia. Universities became increasingly independent research institutes, switching from teaching to research. The growing awareness that investing in science and technology is essential for development led to significant increases in budgets for education and research, including international scientific cooperation, and (post-doctoral) job opportunities. Alongside scientific quality and originality, People-Planet-Profit, Public-Private-Partnerships and other Millennium Development Goals became increasingly important criteria in the scientific cooperation between Indonesia and the Netherlands. At the same time, an urgent public appeal to scientific communities worldwide to deliver objective knowledge on such burning issues as climate change, energy security, pandemic threats, religious tensions, and socio-economic shifts requires further international cooperation and a shift to research that is relevant to society and the environment.

The Joint Working Committee of Indonesian and Dutch partners identified the following three internationally important topics for further cooperation leading to mutual benefits for Indonesia and the Netherlands:

- Food, Non-Food and Water Research,
- Infectious Diseases and Health,
- Social and Economic Development.

These topics will be covered by the new phase of the SPIN programme, which will run from 2012 to 2016. In 2011, the Dutch Ministry of Education, Culture and Science, decided to extend and fund the SPIN programme for an additional five years.

Nine outstanding Joint Research Projects have been selected that will bear the SPIN torch for the next five years. The research plans for these projects are described briefly below. The fact that 86 collaborative teams of Indonesian and Dutch researchers submitted a Letter of Intent attempting to secure one of these nine coveted spots bears witness to the breadth and depth of Indonesian-Dutch research cooperation.

In a recent important development, the Indonesian Director General of Higher Education (DIKTI) signed an agreement with the Dutch Ministry concerning the embedding of fifty DIKTI PhD scholarships within the SPIN programme. This is a very substantial contribution to Indonesian-Dutch scientific cooperation and will open the way for Indonesian junior scholars to expand their scientific knowledge and networks and for the scientific ties between the two countries to grow ever stronger.

SPIN has been an enduring feature in the scientific cooperation between our two countries. The continuing growth of our relationship is symbolized by the fact that in the third phase both sides contribute financially in equal measure. This is a sign of a mature and equal partnership which we all expect to lead to a very fruitful meeting of minds.

Babs van der Bergh, Director Education and Science Policy, OCW

The Indonesian Ministry of Education and Culture has a clear focus and agenda. 'Training the next generation of Indonesian scientists is one of the cornerstones of the further advancement of Indonesia. Towards this end, the Republic is making available a substantial budget for PhD training abroad. The Ministry of Education and Culture is very pleased to contribute 50 PhD scholarships within the SPIN framework. Embedding these positions in existing SPIN networks of collaboration and expertise will surely be beneficial to the candidates involved. Furthermore, the SPIN framework strongly reflects the research collaboration between Indonesian and Dutch faculty members. While DIKTI only provides three years of fully funded scholarship for doctoral candidates, the Dutch hosting universities are willing to cover the cost for the fourth year of the doctoral trajectory.'

The Ministry of Education and Culture is very pleased to contribute 50 PhD scholarships within the SPIN framework. Embedding these positions in existing SPIN networks of collaboration and expertise will surely be beneficial to the candidates involved.

Directorate General for Higher Education, Ministry of Education and Culture of Indonesia

As part of the new SPIN cycle starting in June 2012, two new Academy Professors will be appointed, one to replace Yunita Winarto as Academy Professor for the Social Sciences and one within the field of the Natural Sciences. This means that an Academy Professor will be in place in each of the three SPIN themes. The Academy Professors will cooperate with the Joint Research Projects in their theme, aid their integration and mutual cooperation, and will be involved in disseminating their research finding to a wider academic and general audience.

THE SCIENTIFIC PRACTICE

MAPPING THE DYNAMICS OF THE MIDDLE ZONE



Informal networking. Photo: Collection KITLV

The democratization process has transformed the social landscape of Indonesia. The once seemingly almighty political, bureaucratic and economic elites no longer rule the nation. Their downfall in 1998 paved the way for youth, the middle classes, regional traders and provincial towns to emerge as agents of change. It also triggered a transformation of contemporary social science. The middle zone, long neglected as a grey, transitional area between top and bottom, now deserves to be studied in its own right.

'SPIN isn't just handed to us, we have to earn it. That keeps us on our toes'

Henk Schulte Nordholt, KITLV

Rising to the challenge, the Dutch-Indonesian research team that had earlier been involved in the SPIN project 'Indonesia in Transition' has now decided to zoom in on the dynamics of provincial towns. This has led to the new SPIN project 'In search of Middle Indonesia'. A logical step, according to the Dutch co-initiator Prof. Henk Schulte Nordholt of the Institute of Southeast Asian and Caribbean Studies, KITLV. Previous studies on decentralization provided valuable insights and basic data on the role of provincial towns. 'In-depth discussions and comparative studies available at the KITLV library helped us focus and redefine our conceptual framework,' recalls Prof. Mohtar Mas'oe, the Indonesian co-initiator at Gadjah Mada University (UGM). Under the umbrella of Middle Indonesia, four PhD students supported by a range of post-doc experts did participatory research in towns in Java and the outer regions to get a better picture of how the intermediate classes make a living and are asserting themselves to shape their future.

'SPIN links young researchers from the Netherlands and Indonesia and offers them the scope to build dense international networks'

Sylvia Tidey, PhD

'Very inspiring,' concludes Gerry van Klinken of KITLV. As senior fellow he traced the history of Middle Indonesia by examining the creation of provincial towns against the backdrop of the emerging nation state. The state remains embedded in Indonesian society, claims PhD fellow Sylvia Tidey in her dissertation on local bureaucracy in Kupang, West Timor. Provincial towns are now the binding forces that keep the country together. Tidey observed from inside the mayor's office how bureaucrats formed local alliances to strengthen their position in negotiations with both central government and communities. She also looked into the sensitive issue of corruption as a networking mechanism. The research was not easy, but it represented a unique opportunity that earned Tidey an NWO post-doc 'Vidi' scholarship.

'Being part of a bilateral and multidisciplinary project gave me immense support,' says Tidey. Indonesian academics opened doors in the field, while the Dutch connection helped her gain access to international conferences and journals, for example the Asian Studies Association in Australia. Junior and senior fellows held regular meetings, providing a sounding board in the field and during the writing process. 'A fruitful basis

for scientific learning,' summarizes UGM lecturer Amalinda Savirani. Her PhD research on the Javanese town of Pekalongan focused on the socio-political behaviour of young entrepreneurs struggling to revive the local batik industry. Savirani now shares her acquired research skills with her students and colleagues and in doing so is helping identify theoretical concepts and promote discussion and logical thinking. Although busy with her teaching job, she will finalize her dissertation by the end of 2012. The university stimulates and supports Savirani and others to pursue their PhD by providing additional training and editorial services.

'SPIN is a solid academic foundation in my life. It will always be useful'

Amalinda Savirani, PhD, UGM Yogyakarta

The Indonesian scientific climate has improved considerably in recent years, confirm Schulte-Nordholt and Mas'ood. Top universities such as UGM are flourishing thanks to increased government support and a growing number of foreign-trained academics and their international networks. 'The collaboration benefits both sides,' stresses Mas'ood, pointing to the series of research results on Middle Indonesia. 'We all gain from outstanding social science.'

SOURCING BIODIVERSITY TO IMPROVE FOOD CROPS



Thrips on a pepper flower. Photo: Sjaak van Heusden

Food security and sustainable food production are global challenges that require a range of food crop innovations. Advanced technologies enable scientists to exploit biodiversity to improve food crops so that they become more resistant to all kind of pests and contain higher quantities of vitamins, minerals and other nutrients. Dutch and Indonesian plant breeding and biotechnology experts have addressed this challenge by researching the Solanaceae family, consisting of a range of popular vegetables such as tomato, pepper and eggplant. These crops are of economic importance in both countries, as agriculture commodities and as sources of healthy nutrients.

'SPIN accelerates capacity-building and international networking, paving the way for much needed agricultural innovation' Dr Sony Suharsono, Research Center for Natural Resources and Biotechnology, IPB, Bogor from interview

The research that goes under the name INDOSOL was selected as a Priority Programme in 2007 and initiated by the agricultural universities of Wageningen and Bogor. 'Crop improvement is indeed a priority for Indonesia,' emphasizes Sony Suharsono of Bogor Agriculture University, IPB. 'Our research is not only aimed at developing our agriculture sector but also contributes to human resource development, as it gives us access to cutting-edge technology.' For Suharsono, this is an ongoing process. The INDOSOL research project expands on and follows up his team's previous SPIN research project, BIORIN. 'That turned out to be a good investment,' says Sjaak van Heusden of Wageningen. The existing network of academics, research institutes and private companies, and the available BIORIN laboratory at Bogor, provided a solid foundation for outstanding research. Additional funding from the Dutch Ministry of Economic Affairs accelerated the process. 'We discovered the best sources to develop plant resistance against whitefly in tomatoes,' claims Van Heusden. 'And private companies have already started their own breeding programmes.'

Whitefly resistance is only one of the five PhD research projects conducted under the umbrella of INDOSOL. Two projects carried out in collaboration with Radboud University in Nijmegen focused on a new area, i.e. biodiversity of eggplants collected from Indonesia that are also used as a source of medicine. The database of existing species generated in this project is a starting point for further exploration. Two other researchers had a closer look at hot chilli peppers, a standard ingredient in the Indonesian kitchen. 'I'm almost there,' says Yuni Wahyuni. She is on the brink of locating quality traits that regulate health-related compounds eagerly anticipated by breeders. While Wahyuni is guided by earlier research, her colleague Awang Maharijaya had to start from scratch. He aims to trace the resistance factors of pepper against thrips pest. 'It's very addictive research,' says Maharijaya, who is continuously tempted to start additional experiments. 'Because it is really needed, it can really help our country. Back in Indonesia we still lack the facilities.'

'SPIN is a source of immense motivation and energy for young researchers'
Awang Maharijaya, PhD fellow, IPB Bogor

While the BIORIN lab is still used extensively by students at differing levels, it is not equipped for advanced molecular and genetic research. 'Lack of funds is the main cause of the existing gap in quality research between Indonesia and the Netherlands,' notes Van Heusden. SPIN projects help bridge the gap by building capacity in various ways. For the PhD students, INDOSOL is an ongoing learning experience. 'Summer schools, master classes and seminars all contribute to the development of Indonesian science and technology,' emphasizes Suharsono. SPIN opens the door to publications and international networks, and ultimately results in more scientific collaboration, like the partnership with Leiden University in *Jatropha* research. But it is not a one-way street. 'We benefit just as much,' adds Van Heusden, 'because we are expanding our research and writing joint papers for international publications.'

EXPLORING THE POTENTIAL OF THE JATROPHA PLANT



Jatropha field. Photo: Shutterstock

Global discussions of renewable energy have put the spotlight on the *Jatropha curcas* plant. Given its toxic oil and ability to adapt to harsh tropical conditions, *Jatropha* is seen as an attractive source of bio-fuel for Indonesia. With government and private investors already making preparations for large-scale plantations, Dutch and Indonesian chemical scientists were awarded a SPIN Priority Project in 2006 to research the potential exploitation and valorization of the *Jatropha* plant.

'International collaboration is a source of inspiration for science'
Erik Heeres, professor of Chemical Technology, Groningen University

The research is profoundly scientific in nature, despite its economic ramifications. Under the guidance of scientists from Groningen, Wageningen and Bandung, eight PhD candidates and two senior fellows from Indonesia began to study not only the nut but all the components of the *Jatropha* plant. While some investigated how to improve the quality of the products and extend the plant's range of applications, others explored what other products can be generated or extracted from the residues. 'Tropical biomass is a fantastic playground for our discipline,' explains Erik Heeres, professor of applied chemistry at Groningen. The challenge is to obtain as many valuable components as possible from the plant and to look beyond the obvious bio-fuel application, for example at lubricants, reactive coatings, pharmaceutically interesting compounds and proteins as chemical building blocks. 'Training Indonesian students to apply the concept of bio-refinery is the most valuable component of the project's knowledge transfer.'

'SPIN broadened my horizon by facilitating technically advanced analyses'
Daniel Louis, PhD Biotechnology, ITB Bandung

Louis Daniel, a PhD researcher at Bandung Technical Institute (ITB), fully agrees. He succeeded in modifying the chemical structure of the plant oil to prevent rapid oxidation, a common problem in such oils. He also managed to improve its anti-freezing property in order to increase the plant's export potential to non-tropical countries. 'We were able to do that thanks to excellent laboratory facilities in Groningen. Such advanced analyses are impossible in Indonesia.' Even simpler analysis in the Bandung laboratory sometimes failed because it can take weeks or even months to import chemicals, find suitable equipment or send samples to other institutes. 'Very frustrating, because we wasted a lot of time in Indonesia. We were there too long, despite all the effort and money we spent.' Even with the delay, Daniel and his colleagues at both ITB and the Jakarta-based Technical Research Institute BPPT will complete their PhDs in 2012.

'Collaboration is essential,' emphasizes Daniel's Indonesian counterpart Robert Manurung at ITB Bioengineering. The lesson was driven home to him as a PhD student in the Netherlands and as a co-supervisor of PhD researchers. 'The Dutch have the technical facilities, Indonesia has the natural resources. It's a balanced partnership.' In his view, the biggest benefit of collaboration is scientific capacity-building. Manurung sees the project as a major success, although it turned out that the large-scale cultivation of *Jatropha* bio-fuel is scarcely profitable due to low yields. Government fossil fuel subsidies are another obstacle to developing bio-fuel. More multidisciplinary research and supporting policies are needed. 'It took fifty years to develop oil palm,' notes Heeres. Both researchers are happy to continue their collaboration as partners in the NWO/Academy-sponsored SPIN project Agriculture beyond Food, which began in 2009 and involves multidisciplinary research on biomass, including *Jatropha* and palm oil.

'Research collaboration has promoted our involvement in the development of a green economy in Indonesia'

Dr Robert Manurung, ITB Bioengineering Bandung

Manurung hopes the new research will lead to a breakthrough. Once bio-fuel becomes commercially interesting, investors will be willing to set up expensive laboratories that government is unable to afford. Only then will Daniel and other young scientists be able to apply their newly required skills and knowledge to develop innovative technologies in Indonesia itself. Meanwhile, Heeres uses his Indonesian network to scout potential PhD students. 'With the new Indonesian DIKTI PhD scholarship option, research collaboration with Indonesian universities and institutes at PhD level has taken on a new dimension.'

UNTANGLING THE WEB OF IMMUNE RESPONSES, GENETIC MAKE-UP AND ENVIRONMENT



School kids involved in the study. Photo: M.Yazdanbakhsh

Indonesia is changing rapidly. Socio-economic transition and the lifestyle changes that accompany it also affect the pattern of human infection and disease, offering scientists a unique opportunity to study the dynamics of the immune system. Such research can lead to new treatments for infectious diseases such as malaria in the tropics and for inflammatory diseases such as allergies that are more prevalent in the West.

'SPIN stands for a benchmark: it gets the absolute best out of scientists, combining excellent research and long-term vision'

Dr Maria Yazdanbakhsh, professor of Cellular Immunology Parasitic Infections, Leiden

'Joint research works well,' stresses Maria Yazdanbakhsh, professor in parasitology in Leiden. She had already enjoyed a long collaboration with her Indonesian colleague, Dr Taniawati Supali of the University of Indonesia, when they were awarded a new SPIN grant in 2005. Their joint research focused on immune responses to intestinal worms (helminths) and malaria co-infections, their aim being to discover if and how the worms affect the human body's battle against malaria. By comparing a rural and a semi-urban population whose lifestyles change at different rates, they were able to study the effects of environmental factors on the immune response, specifically the risk factors associated with allergies. 'This is one of the few long-term population studies that also involves a trial,' stresses Yazdanbakhsh. Its significance is widely acknowledged, given the additional funding provided by the European Union and the Bill and Melinda Gates Foundation.

When the Indonesian-Dutch research team set foot in the field in 2005, Indonesia's transition had been much quicker than expected at the design stage. The prevalence of malarial infections had declined significantly in the selected research areas in Southern Sumatra – so much so that the study had to be moved to far-away Flores island. For the project this meant a significant delay. It had to build a new network, conduct new baseline surveys and set up its field laboratory in a region with limited infrastructure. For the three PhD fellows it was a logistic nightmare. In hindsight, however, it turned out to be a great learning opportunity. 'We became very creative when confronted with poor roads, limited electricity and internet,' says Firdaus Hamid, who spent most of his time in the field with Aprilianto Eddy Wiria. 'Amazing, such advanced science in a small village on Flores,' according to Linda Wammes, referring to all the sample analyses they did in the field laboratory.

'SPIN is the catalyst for Indonesian research at an international level'

Aprilianto Eddy Wiria, PhD fellow UI, Jakarta

The PhD fellows, all trained medical doctors, made a great effort to explain and educate the local population about parasitic infections and health in general. This ensured a strong bond with the research subjects and only a small number of withdrawals during the two-year study. Training of local health workers and volunteers ensured

loyal support, increased health awareness and improved patient care. 'Social benefits add value to scientific research,' stresses the Indonesian coordinator Supali. The knife needs to cut both ways. The project will produce four PhDs and four MScs and it provided training to several more research students, technicians and health workers.

The PhD students are finalizing their complex molecular analyses in Leiden, while simultaneously presenting research data at international forums. 'Many more publications will follow,' expects Yazdanbakhsh, pointing to initial results that confirm the worms provide relevant clues on immune response. Although the impact on malaria also seems to depend on other factors, new analysis is indicating a possible interesting relationship with diabetes and blood lipid. PhD researchers hope Yazdanbakhsh's expectation will come true. 'Publications are our main platform,' explains Hamid. 'They provide much-needed visibility and open doors to future research.'

FOLLOWING THE FLOW, FROM RIVER BASIN TO CORAL REEF



Installing a GPS on a fishing platform. Photo: Frans Buschman

The natural richness of East Kalimantan, with its major rivers and well-developed deltas, is a treasure-trove for scientists. But it also attracts mining companies and migrant workers. While some areas are still relatively pristine, others are rapidly being transformed by human activity, resulting in a drastic degradation of the ecosystem. This makes the coastal zones of East Kalimantan a priority area for exploring the relationship between Planet, People and Profit and addressing contemporary issues of sustainable development and climate change. Reason enough for the Indonesian Consortium on Coastal and Marine Research, the Royal Academy and NWO to initiate a pilot study in 2002. Three years later, this resulted in a multidisciplinary study in two deltas, the virtually untouched Berau and the fast-changing Mahakam delta.

'SPIN creates a basis for sustainable development in Indonesia and fosters scientific progress on global themes like biodiversity and climate change'

Dr Ton Hoitink, Wageningen University

'A really unique opportunity,' states Piet Hoekstra, a physical geographer at Utrecht University, pointing at the map of the Berau delta. 'This is a nearly pristine area of over four hundred kilometres.' Following the river flow from basin to barrier reef offered valuable insights into generic processes of water flow and sedimentation under natural circumstances. 'You need to comprehend the processes first before you can start working on a solution,' explains hydrologist Ton Hoitink of Wageningen University. His team's data on the natural peak discharge in the upper reaches of the Mahakam and its tidal salt influx provide relevant data on flooding processes. In the past five years, Hoekstra, Hoitink and their Indonesian-Dutch team of geographers, hydrologists, geologists, biologists and legal experts gathered large quantities of data, each group focusing on its own field of expertise. These basic data form the building blocks for multidisciplinary analyses. 'We can now generate different change scenarios, showing how altering one element triggers a whole chain of responses, transforming the natural, social and economic landscape,' explains Hoekstra. Transposed into colourful graphics, they provide practical guidance for strategic interventions. Policymakers in Kalimantan are not the only ones to benefit. The research methodology and simulation models will be applied in future studies on sustainable delta development in the Netherlands and in China.

Inputs for sustainable development are urgently needed to break the cycle of deforestation and address the marginalization process of local communities, stresses PhD researcher Rizki Pandu Permana. His research on the socio-economic impact of land conversions in Berau demonstrates how a combination of decentralization and economic development further accelerated the deforestation process through increased migration, logging, mining and palm oil cultivation. Marine biologist Marjolijn Christianen witnessed the economic boom both on the ground and under water, researching the impact of soil erosion and related high turbidity levels on the

coastal zones. Although her experiments on sea grass and sea turtles are very scientific in nature, she always tries to develop them into more practical guidelines. 'Being part of an interdisciplinary project makes that possible.'

'Being part of an international research team is one of the most valuable experiences in my life, both professionally and personally'

Rizki Pandu Permana, PhD fellow, Agriculture University Bogor

Hydrologist Hidayat, a fellow PhD researcher from the Indonesian Scientific Research Institute LIPI, has found his own way to add social relevance to basic science. For his field research on rainfall and river discharges in the Mahakam, he involved students from the local university. All concerned benefited from the transfer of technology: the students got a chance to use high-tech measurement instruments, and the research could be continued during Hidayat's absence from the field. 'Thanks to these additional data on extreme drought and flooding, we were able to develop a hydraulic-hydrologic model,' notes Hidayat with satisfaction. He never expected he would come this far, given the limited resources and facilities in Indonesia. The collaboration opened doors to training, remote sensing technologies, NASA data, international seminars and journals. Jan Sopaheluwakan, co-initiator of the project at LIPI, agrees. 'Creating opportunities for field research in an international context is essential for accelerating capacity-building and scientific maturity. Now we can build a solid post-doctoral network to bridge the gap between science and policy.' Safwan Hadi, professor of Oceanology at ITB Bandung, agrees. 'The project provides essential field work experience for our young academics, something that is still lacking in Indonesia.'

ZOOMING IN ON BIOFUEL CROPS



Jatropha Fruits. Photo: Erik Heeres.

Global issues call for an interdisciplinary approach. Indonesian and Dutch policy-makers realized as much when they started looking for common ground to develop bio-based economies. While Indonesia wants to exploit its biomass as an alternative for fossil fuels, the Netherlands focuses on processing and added value. Both countries are concerned about sustainability and want to ensure that bio-fuel production will not undermine biodiversity or food security. NWO, the Royal Academy and the Indonesian Ministry of Research and Technology have recognized the added value of joint interdisciplinary research. In 2009 they developed the Agriculture beyond Food (AbF) framework in order to gain a better understanding of the opportunities, threats and limitations of biomass.

'Promoting multidisciplinary research is a major challenge, but very rewarding as it strengthens international scientific collaboration'

Huub Löffler, Wageningen University

'It's an enormous challenge to work with various disciplines at several levels simultaneously,' says Huub Löffler, the overall project coordinator. The research consists of three clusters focusing on specific aspects of the bio-based economy, i.e. the commoditization process, technical innovations, and societal impact. Regular meetings over the last two years have improved the synergy between the relevant researchers in the humanities, science and social sciences. 'We are now feeling the direct benefits,' elaborates Jacqueline Vel. She is the coordinator of the JARAK research team, which looks at the social and economic, agronomic and legal factors associated with the commoditization of the *Jatropha* plant as a biofuel crop and alternative for the widely criticized cultivation of palm oil. Her team encourages technical researchers to consider how their new technologies can be successfully applied in practice in specific areas in Indonesia, and how to increase equitable access to processing equipment for smallholders. The technical innovation team, headed by Erik Heeres of Groningen University, is developing a mobile factory for processing oil crops. Heeres can build on a long-term partnership with Indonesian scientists, as he previously worked on SPIN research involving the valorization of *Jatropha*. It was a valuable network for the whole project, says Vel. 'Thanks to our biochemistry and agronomy experts, we gained direct access to and a better understanding of the private sector.'

'SPIN broadens your international network, creating new opportunities for scientific collaboration'

Suraya Afiff, Jarak post-doc researcher, University of Indonesia, Jakarta

The global discussion on climate change, carbon emissions and the depletion of fossil fuels has led to a chain of reactions, accelerating the commoditization of *Jatropha*. A network that included foreign investors, airline companies, local government officials and farmers all jumped at the opportunity. The expected large-scale production of *Jatropha* failed to take off. 'But the well-connected stakeholders still benefited,' says

Suraya Afiff, JARAK's senior researcher at the University of Indonesia. 'Initial findings indicate they benefitted from international and national government subsidies.' PhD researcher Loes van Rooijen is studying the legal and policy framework related to Jatropha activities. Her fieldwork in Flores indicates that coordination between various governmental levels and between line ministries represents a significant challenge for implementing the Jatropha programme at local level. Such findings offer valuable lessons when developing other potential biofuel crops.

To facilitate targeted interventions, another team headed by Anneke Zoomers is looking into the societal impacts of palm oil intensification. Senior researcher Paul Burgers of Utrecht University and his PhD fellow Ari Susanti of Gadjah Mada University are focusing on its impact on human migration flows and the transformation of forests in Sumatra. The plantation sector has recruited Javanese migrants as labourers and smallholders ever since colonial times, but the migration doesn't stop there, indicates Burgers. Once settled, migrants trigger a second wave of migration that is difficult to control. 'These migrants play a significant role in the continuing expansion of palm oil plantations, leading to further deforestation,' adds Susanti.

'Being part of a SPIN research project expands my international network and increases academic leverage through articles and publications'

Ari Susanti, Migration & Forest transformation PhD fellow, Gadjah Mada University, Yogyakarta

The research is now at the halfway point and the outcomes look promising. 'Putting the pieces together remains an effort,' stresses Burgers. Team coordinators play a key role in linking the data collected from various teams and disciplines. PhD researchers like Van Rooijen and Susanti have to stay focused on their own field, although they feel that stepping outside the box keeps their minds sharp. For Afiff and other senior fellows, the most rewarding aspect of the interdisciplinary approach is that they are expanding their network, resulting in several new partnerships between various universities. 'And now that we're starting to co-author articles, the partnerships are becoming even more inspiring.'

ACADEMY PROFESSORS INDONESIA

First Academy Professor Indonesia: Social Sciences

Dr Yunita Winarto was inaugurated as the first Academy Professor Indonesia in the Social Sciences in February 2007 at Gadjah Mada University in Yogyakarta, with subsequent support by Universitas Indonesia in Jakarta. Prof. Winarto has found the experience very rewarding. 'Scouting among the younger generation of scholars was one advantage of the research grant. Oftentimes a constraint within the Indonesian academic culture is the lack of an established system of involving young scholars in the entire process of producing qualified academic knowledge as part of their learning process to be good scholars in the future. Junior scholars are used to be hired as fieldworkers or research assistants to collect data and write field reports without being involved in preparing, producing, and presenting the tentative or final products of the knowledge they contribute to discovering.'

Another benefit of her Academy Professorship, which ended in 2011, was that the financial support made it possible for Prof. Winarto to respond swiftly to any emerging and unanticipated socio-cultural phenomena within her field of study that went beyond the initial research plans. Examples include the unexpected needs of the farming community in which ethnographic fieldwork was carried out; the unusual climate conditions of 2009-2011 affecting farming strategies and ecosystems in the region involved; and the unprecedented outbreaks of pests and diseases due to climate variability and longer-term changes.

I could not have imagined that I would have been able to produce so many academic works in the past five years without the opportunities provided by the Royal Academy and AIPI. I was very fortunate to be able to develop in full capacity – and without any distraction – the scientific endeavours I have always been dreaming to pursue.

Yunita Winarto, Academy Professor Indonesia: Social Sciences

Second Academy Professor Indonesia: Life Sciences

Dr David Handojo Muljono was inaugurated as the Academy Professor Indonesia in the Life Sciences in December 2011 at Hasanuddin University of Makassar.

His work as an Academy Professor is guided by the notion that the contributions of medical research to human health come from two areas: basic research, which elaborates scientific knowledge in order to develop new treatment strategies, and clinical research, which evaluates the safety and efficacy of such new treatments. In Prof. Muljono's view, the advancement of medical research depends on the role medical education plays in augmenting and maintaining research capacity. One of the primary problems of medical science is that basic research has been driven by the idea that the body's complex system can be understood by studying the smaller constituents that determine the disease mechanism. Basic scientists have worked in an environment that limits their involvement in human or clinically oriented problems. Clinicians, on the other hand, have an obligation to adhere to standards of practice but no opportunity to update science, making it difficult for them to apply these advances in clinical practice.

In his term as Academy Professor, Prof. Muljono aims to develop two approaches in Indonesia to build research capacity in medical research. The first is to integrate researchers and clinicians in a research activity where scientists working in basic science and in clinical medicine can complement one another. He has chosen to integrate the two components in the study of infectious disease at the pathogen-and-host interface. The second approach is to bridge the gap by training and creating physician-scientists who can transform clinical observations into testable research hypotheses and translate research findings into medical advances. This approach will motivate medical students and young medical graduates to undertake research careers, thereby building research capacity at Indonesian universities.

As health science advanced over the past decades, research activities have been lumped into specialty areas and disconnected from the greater whole by technical, cultural, administrative differences, and disparities in scientific capacity. SPIN offers a unique opportunity to dissolve these interdisciplinary boundaries that impede the pace of scientific discovery in health research.

David Handojo Muljono, Academy Professor Indonesia: Life Sciences

**NEW SPIN JOINT RESEARCH
PROJECTS (2012-2016)**

THE INDONESIAN BANANA:

Protecting a staple food from Panama disease collapse and exploiting its genetic diversity for discovery research

Disease outbreaks have dramatic impacts and destabilizing effects on societies. Few plant diseases have devastated the production of a food crop as severely as Panama disease, which attacks the banana plant. It cannot be controlled by regular crop protection methods and the spores of the soil-borne fungus that causes the disease contaminate soils for decades, thus knocking out banana production. Panama disease wiped out large areas of bananas plantation in Central and South America in the first half of the 20th century, with an economic impact of at least \$2.3 billion. This had a major influence on land acquisition strategies in the banana industry and, consequently, significantly impacted societal relationships. Fortunately, the shift to a



Banana plantation destroyed by Panama disease. Photo: Gert Kema

resistant banana cultivar – the Cavendish banana – saved banana production in the region and restored economic vitality. However, Panama disease has re-emerged in Southeast Asia in a new, virulent strain of the fungus called Tropical Race 4 (TR4). Cavendish is highly susceptible to TR4, which has destroyed bananas destined for domestic and international markets and spread rapidly throughout the region. Thousands of hectares of Cavendish have been devastated in Indonesia and Malaysia, and TR4 damage comes to \$400 million in the Philippines alone. Although TR4 is a huge concern for the global export banana sector, it has an even greater impact on the domestic production of this staple crop; many locally preferred cultivars succumb to TR4, thereby threatening the livelihoods of millions of smallholder producers with no substitute resistant varieties. The relevant international and national research and policymaking communities have therefore raised the alarm and called for concerted action to control this disease.

The overall objective of this project is to provide sustainable solutions for this food security threat by delivering fundamental knowledge on the banana plant, the TR4 fungus and their mutual interaction in relation to the soil-borne origin of the disease. The project is embedded in a social science framework that recognizes the relevance of human behaviour and collective responses for sustaining local banana production in Indonesia. It is a multidisciplinary cluster of six integrated projects crucial for global Panama disease management, with a strong focus on biological diversity, ecological variability and institutional variety as an entry point for detecting mechanisms that lead to enhanced resilience. The project explores Indonesia's rich biodiversity as a means of securing food production at local, regional and global levels. The specific objectives of the sub-projects are to discover and describe diversity in the banana-growing region of Indonesia and to clarify the structure of the co-evolving fungal complex while considering the impact on local growers, who are trying to cope with an unmanageable disease and crop devastation. The project provides Indonesian scientists with ample opportunities to join forces with ongoing and new international research programmes and links in with the national strategic plan for Agriculture, Fisheries, and Forestry Revitalization, which targets a banana production of 11.27 mton in 2025. This project provides the tools, methods and network to effectively manage TR4 and hence to achieve this ambition, along with a spin-off to secure international banana production.

Indonesian project leader: Dr Catur Hermanto, Indonesian Tropical Fruits Research Institute
Dutch project leader: Dr Gert Kema, Wageningen University

HYDROLOGY-GEOMORPHOLOGY LINKS IN THE KAPUAS RIVER SYSTEM

The Kapuas is the largest river system in Indonesia and the world's longest river on an island, stretching more than 1100 km in a relatively pristine region dominated by lowland forest and peatlands. The length of the river, the complex geomorphology of the lowland channel network and the hydrological links with the adjacent peat bogs and inland wetlands render the Kapuas river system represent a challenging subject for scientific study. The overall objective of this research project is to establish and understand the interlinked processes governing the hydrology and geomorphology of the Kapuas River, its delta, the Kapuas Hulu wetland region and the peatlands connected to the river. This will yield new scientific insights in the fields of hydrology and geomorphology, which can be linked to aquatic ecology and form a solid basis for science-based water resources management and river engineering in the future. The knowledge gained in the project will be used to reveal the main factors controlling drought in peat forests and wetland areas, including the associated wildfires, and to analyse problems of flooding and salinity intrusion in the downstream lowland region.

At the basin scale, the project will study processes governing the terrestrial water cycle, subsurface hydrology, land-sea surface water interactions and the factors controlling river channel morphology, using a set of models that include the Community Land Model (CLM) and a multi-scale hydrodynamic model. The interlinked models will be tested, calibrated and validated with existing remote-sensing information and new measurements from surface and subsurface level gauges, soil moisture stations, rain gauges, and two discharge monitoring stations in the river equipped with horizontal acoustic Doppler current profilers. The initial aim for the models is to simulate and understand the hydrological functioning of the Kapuas River basin and historic and projected events of floods and droughts. Subsequently, the models will be used to simulate basin-scale sediment runoff and transport in the river channel network, and to establish the links with river channel morphology.

At a local scale, the project will focus on wetland functioning, hydrogeology of peat forests, water and sediment division at channel junctions, and the morphology of complex river bends. The CLM and an integrated sediment transport module will be used to establish the vulnerability of the Kapuas Hulu wetlands to changes in the hydrological regime and in sediment runoff, in terms of the pristine aquatic ecology. Regarding the hydrogeology of peat forests, emphasis will be placed on drought development in order to specify the conditions leading to forest fires. Focusing on the river delta,

two key channel junctions will be analysed in detail so as to understand the processes controlling the distribution of water and sediment over distributary channels. To this end, a local-scale morphodynamic model will be set up to explore the impacts of changes in discharge regime and sediment runoff on channel junction morphology. Finally, processes forming sharp river bends will be the subject of study, assimilating results from high-resolution flow simulations with geographical information and with the outcomes of the hydrological studies.

Indonesian project leader: Prof. Delinom, Indonesian Institute of Sciences

Dutch project leader: Dr Ton Hoitink, Wageningen University

WORM INFECTIONS AND DIABETES MELLITUS, A MULTIDISCIPLINARY STUDY ON THE ISLAND OF FLORES

Cardiovascular diseases are no longer a problem only for rich Western countries: 80% of deaths from these diseases are now estimated to occur in developing countries. Type 2 diabetes mellitus (DM2) is a significant risk factor for cardiovascular diseases and is closely associated with a Western lifestyle. In Asia, there is currently a rapidly growing epidemic of DM2. By 2030, India, China, and Indonesia are likely to be among the countries with the highest occurrence of DM2. This epidemic is a major burden on the healthcare system and prevention is therefore of great importance. Developing



Population research in Flores. Photo: Jan Smit

prevention programmes requires a knowledge of all the factors that are relevant to the development of DM2. Rapid economic development in Asia is leading to major changes in infrastructure, technology, and the food supply which are associated with excess food intake and a lack of physical exercise, thus leading to an increase in DM2. Along with the disappearance of traditional lifestyles, the disappearance or reduction of infectious diseases also plays a role. Besides changes in eating patterns and physical activity, inflammatory processes also play a major role in the development of DM2. It is therefore plausible that the effects of changing infection pressure on the immune system also play a role in the development of DM2 in developing countries.

In an earlier study on the Indonesian island of Flores, our group discovered that parasitic infections (worm infections) reduce the activity of the immune system and that people who were suffering from such infections had a more favourable blood sugar profile than those who were not. In the current programme, we intend investigating the relationship between worm infections and DM2 and the underlying mechanisms. To that end, an interdisciplinary research programme has been set up involving researchers engaged in clinical and basic research, social medicine, and statistics. The hypothesis that worm infections reduce the likelihood of people developing DM2 will be investigated in a controlled study in which inhabitants of the island of Flores will be treated with anti-worm medication or control medication. The study will investigate the effect of the disappearance of worm infections on blood sugar metabolism and the immunological mechanisms that play a role. All relevant lifestyle and socio-cultural factors will also be studied. In order to determine the mechanism, studies will also be carried out on laboratory models of worm infections and DM2. Given the variety and complexity of the data collected, methods will also be developed for analysing that data and integrating it into a model that will describe the contribution of worm infections together with all other relevant factors in the development of DM2. The intention of the programme is to develop instruments for use by policy-makers engaged in constructing DM2 prevention programmes in Indonesia.

Indonesian project leader: [Dr Taniawati Supali, University of Indonesia](#)

Dutch project leader: [Prof. Jan Smit, Leiden University Medical Center](#)

HIGHLY PATHOGENIC AVIAN INFLUENZA VIRUS

Highly Pathogenic Avian Influenza virus (HPAIV) is widespread in Indonesian poultry and individual cases of infection in humans, generally fatal, are reported regularly. The virus's biggest threat, however, is its ability to re-assort with other influenza viruses, creating the potential for an influenza pandemic in humans. Recent attempts to eliminate HPAIV from the Indonesian poultry population have been unsuccessful and the disease is moving farther eastwards. Although effective vaccines are available, the vaccination programmes have not eliminated HPAIV. Moreover, eradication by culling infected flocks, a successful strategy in Thailand, was not feasible in Indonesia. In addition, cooperation on controlling HPAI between the Indonesian veterinary authorities and poultry industry is suboptimal.



Stacks of eggs on the move. Photo: Arjan Stegeman

To improve the HPAI situation, it is crucial to develop control measures that fit the Indonesian context. That requires understanding the transmission routes of HPAIv within and between the various sectors of poultry husbandry and their importance, and the incentives in the poultry chain that drive contacts between the different parts of that chain. Once these are known, it becomes possible to examine how changes in incentives can affect contacts within the poultry chain and, consequently, the transmission of HPAIv.

This project will begin with a detailed description of poultry husbandry in Indonesia, broken down into broiler chickens, layer chickens, ducks and backyard poultry. Next, a field study will identify and quantify the existing contacts between farms within each of these chains, but also with farms belonging to other poultry chains. This information will be used to develop a mathematical model describing the contact structure of Indonesian poultry husbandry and virus transmission within this contact structure. To establish relevant transmission routes between various parts of the poultry chain, the project will involve a molecular epidemiological analysis of HPAIv isolates that have been collected in the past five years and during the field study. In addition, literature and expert knowledge will be used to parameterize the model. The mathematical model will be validated (in part) using prevalences of infection observed in other field studies.

On the basis of this model, the researchers will then perform a value (money and commodity) chain analysis of Indonesian poultry production that systematically summarizes the relationships, characteristics and dynamics among different actors. Next, they will create simulation models for the main actors that allow for evaluation of the economic effect of measures, including changes in the contacts between farms and improved bio-security. They will also be able to investigate the effect that changes in the value exchange in the poultry chain have on the contact structure. Finally, the project will consider which organizational forms in the Indonesian poultry supply chain and government intervention provide the most efficient means of coordination under conditions of food safety and security.

Indonesian project leader: Prof. Retno Damayanti Soeyoedono, Bogor Agricultural University

Dutch project leader: Prof. Arjan Stegeman, Utrecht University

NOVEL STRATEGIES AND TOOLS FOR ANTIMICROBIAL RESISTANCE SURVEILLANCE

Antimicrobial resistance (AMR) represents one of the gravest threats to global health. A return to the pre-antibiotic era is imminent unless efforts to combat AMR are prioritized. Key to such efforts is adequate surveillance of AMR at local levels in order to inform empirical antimicrobial treatment and monitor efforts to control AMR and to inform policy at national and international levels. Conventional AMR surveillance is costly, logistically challenging (especially in settings with limited resources) and usually does not provide relevant timely information that can optimize individual patient care. Furthermore, microbiology capacity and quality is often insufficient to support



Telemicrobiology: virtual lab rounds between microbiology laboratories in Asia and the Netherlands. Photo: Menno de Jong

reliable AMR surveillance. Novel approaches are thus needed that require minimum resources and produce a maximum yield in terms of quality and relevant data. The mission of our project is to achieve this aim by combining an efficient sampling strategy – *Lot Quality Assurance Sampling (LQAS)* – with internet-based capacity-building and e-learning: the *Telemicrobiology* approach.

LQAS is a classification tool originating in industry in which the predefined prevalence of a particular outcome should lead to a responsive action (e.g. rejection of a production batch, or in the case of AMR, adjustment of empirical antimicrobial treatment guidelines). This approach requires only small sample sizes, hence improving feasibility and the speed at which relevant AMR data can be acquired. The Telemicrobiology approach combines interactive virtual ‘lab rounds’ between peers, using a designated high-resolution digital imaging tool and the internet with e-learning in a blended continuous learning approach that combines workshops and digital teaching resources.

The objective of the project is to validate, optimize and implement the use of LQAS-based AMR surveillance, supported by Telemicrobiology, as a feasible and cost-effective strategy to inform local antimicrobial stewardship programmes and to estimate AMR prevalence. This objective will be addressed in two closely related PhD projects. One focuses on epidemiology and mathematical modelling, addressing the validation and optimization of LQAS-based surveillance versus conventional surveillance as well as issues such as bias introduced by hospital-based surveillance or negative cultures. The second PhD project focuses on clinical and microbiological aspects, including the impact of LQAS-based surveillance data on appropriateness of empirical therapy, the genetic basis of AMR, and the impact of Telemicrobiology on laboratory capacity and quality. The surveillance studies will target urinary tract infections caused by *Escherichia coli* and *Klebsiella pneumoniae*, and will be performed at primary, secondary and tertiary health care facilities in Bandung (Java) and Medan.

Besides providing a wealth of data on AMR and its consequences, this project will potentially deliver a strategy for AMR surveillance which not only is feasible in settings with limited resources, but which may prove valuable in any setting worldwide. In addition, Telemicrobiology approaches may provide much-needed tools for sustainable capacity-building in microbiology, which can be applied in networks of laboratories in Indonesia, Southeast Asia, and globally.

Indonesian project leader: Dr Ida Parwati, Padjadjaran University

Dutch project leader: Prof. Menno de Jong, University of Amsterdam

LOCAL AND REGIONAL DIMENSIONS IN INDONESIA'S SOCIAL AND ECONOMIC DEVELOPMENT: A GOVERNANCE APPROACH

Indonesia recently witnessed dramatic changes in its economic, political and spatial landscape. In the economic context, it experienced very uneven economic development between regions, resulting in wide gaps in per capita income, most notably between urban and rural areas. Although our theoretical and empirical understanding of the generic forces that lead to the clustering of economic activity has improved, the specific mechanisms may vary considerably from one country or region to the next, depending in part on the institutional context within which they take place. In any case, such clustering gives rise to complex equity-efficiency trade-offs.

In terms of the political landscape, the fall of Suharto in 1998 marked the beginning of a transformation from an authoritarian regime towards a more democratic society. Increasingly, greater autonomy is being delegated to about 500 districts in various areas of governance, including public works, health, education, agriculture, industry, trade and environment. The quality of governance and the success with which democratic reform has been introduced at local levels vary widely. Consequently, it is not yet clear how further fragmentation of government decision-making power will affect the quality of governance across Indonesia and the associated economic development potential of regions.

At the spatial level, metropolitan areas in Indonesia are increasingly facing challenges due to rapid urbanization and motorization, which – in combination with insufficient investment in transport infrastructure – are linked to urban poverty and social exclusion. Major investments have been made in Bus Rapid Transit systems in Jakarta and Bandung in recent years. It is not yet clear how changes in the political landscape have affected transport investment decisions in rapidly growing metropolitan areas, and how investment in transport infrastructure or the lack of such investment have influenced urban poverty and social exclusion.

These developments are taking place against a background of growing consensus that the quality of governance is a key driver. Furthermore, there is increased awareness of the enhanced core-periphery structures that can result in a rapidly globalizing world. These developments raise complicated questions as regards fundamental equity-efficiency trade-offs. Developing robust policies in such a world is a complex matter, as exemplified by the recent passionate debate about place versus people-based policies. Such debates emphasize the fact that one-size-fits-all policies are

an illusion and that policy impact and effectiveness are crucially dependent on the governance structures that are in place.

This project aims to enhance our understanding of the complex relationships between governance and economic and regional development in three closely inter-related PhD sub-projects. The first of these will focus on regional convergence patterns and the development of Indonesia's position in the world economy from the macro-perspective. The second will take a micro-perspective by using detailed micro-data on Indonesian firms and workers to enhance our understanding of the location and mobility behaviour of economic actors, and the size and nature of agglomeration externalities. The third project will take a case-study approach and focus on interregional and intra-regional transport infrastructure investments and their impact on urban poverty and social inclusion.

Indonesian project leader: Prof. Ari Kuncoro, University of Indonesia

Dutch project leader: Prof. Henri de Groot, Free University Amsterdam

FROM CLIENTS TO CITIZENS? EMERGING CITIZENSHIP IN DEMOCRATIZING INDONESIA

Democratic citizenship refers to the capacity and willingness of citizens to actively influence the functioning of state institutions. While considered a vital correlate of democratization and the rule of law, its largely Western-oriented literature rarely studies the forms of democratic citizenship that emerge in the context of a weakly institutionalized state and a largely clientelistic political system. Citizenship in Indonesia is hardly studied, as the concept was long considered inadequate to describe the hierarchical and clientelistic relations that characterized much state-citizen interaction during and before the New Order. Yet the nature of Indonesia's democratization process makes it necessary to go beyond the more common elite-focused research on Indonesian politics to study the way citizenship is perceived and practised by ordinary Indonesians. *From Clients to Citizens?* aims to understand the impact of Indonesia's democratization process on everyday state-citizen interaction: *to what extent is Indonesia's democratic transition changing the way ordinary Indonesians relate to the state in terms of citizenship? How can we explain both the changes and the continuities?*

In addressing these questions, *From Clients to Citizens?* aims to make three major contributions to a better understanding of democratization and the articulation of citizenship in Indonesia. First, as citizenship is generally studied in the context of a liberal, high-capacity welfare state, this project aims to improve our understanding of how democratic citizenship takes shape in the context of a weakly institutionalized, post-colonial state. This project focuses on the relationship between citizenship, political clientelism and the institutionalization of the rule of law – in our eyes a vital issue, yet largely ignored in the literature on citizenship. We need to understand under what circumstances clientelistic practices may be displaced by successful citizenship claims. Second, this project aims to study how historical trajectories of state formation feed into contemporary forms of state-citizen interaction. It examines to what extent currently prevailing norms of citizenship can be traced back to older (cultural) notions of authority and political legitimacy. Thirdly, this project aims to improve our understanding of differences in political practices and attitudes within Indonesia. It uses a comparative examination of the contrasts between (and within) greater Jakarta, South Sulawesi and Lampung to understand how regional differences – for example in terms of the size of the informal economy,

the character of local trust networks, the history of indirect rule or the regulatory capacity of the state – affect the strategies and attitudes that citizens adopt vis-à-vis those in power.

To address these questions, *From Clients to Citizens?* engages in both historical and ethnographic studies of everyday interactions between citizens, state institutions and political intermediaries. Focusing on key citizenship struggles in contemporary Indonesia – such as the anti-corruption mobilization and the campaigns to institute Islamic morality, to secure land rights, to receive adequate public services and to achieve social security reform – the project’s seven sub-studies aim to capture the changing norms, practices and discursive strategies that citizens adopt vis-à-vis those in power. This project’s shared comparative approach maximizes synergies between the sub-projects as they study three complementary aspects of the emergence of democratic citizenship in Indonesia: how is democratization affecting (1) the dependence of citizens on political patrons, (2) the strategies and discourse that citizens adopt to secure their rights and (3) the accessibility and the character of Indonesia’s public sphere?

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Being young in a provincial town. Photo: Collection KITLV

SOCIAL AND ECONOMIC EFFECTS OF PARTNERING FOR SUSTAINABLE CHANGE IN AGRICULTURAL COMMODITY CHAINS: A SOUTHERN PERSPECTIVE

Indonesian actors have become closely involved in many global certifying partnerships that connect southern production to northern consumption. These partnerships aim to promote the sustainable production of agricultural commodities and are expected to simultaneously serve business and development interests. This change in global commodity chains will have a particular impact on the export-driven part of the Indonesian agricultural economy, which is very important to development. For



Sumatra coffee beans. Photo: Ron Corvers

suppliers in developing countries, the global standards are becoming de facto market requirements. In the face of this change, Indonesian actors in business, civil society and government need to redefine their position. However, the social and economic effects of partnering for sustainable change in agricultural commodity chains are still widely debated. The current state of research indicates that little is known about the activities of such partnerships in producing countries and what they achieve for the beneficiaries they intend to serve. The tendency of partnerships to compete with one another for market share, prominence and legitimacy adds to the confusion.

Against this background, this research project aims to fill the knowledge gap regarding the capacity of global certifying partnerships to deliver on their proposed added value, particularly by analysing the social and economic effects of global certification for smallholder farmers in Indonesia. The sustainability challenges of the commodity chains are understood as a 'development problem' and an interrelated 'governance problem'. Our research will take an institutional systems perspective to study these interrelated problems. This entails focusing on the interrelations between the main actors in the field of research, their activities, and the effects of these activities, while assuming that in the short term, the characteristics of the agricultural production system may constrain any system changes. Focal points of the project are intervention logics, effects, options for change and strategies for change, which are connected through the main actors' joint knowledge production. The global coffee and palm oil chains serve as main fields of research in the assessment part of our project. The prospective part of our research includes cocoa, spices, and aquaculture, commodities with new certifying partnerships in an early stage of development and implementation. These agricultural commodity chains face various sustainability challenges, including environmental degradation, abundant use of agrochemicals, poor working conditions, and widespread poverty. The analysis part of the project combines governance theory and agricultural and institutional economic theory and applies a variety of quantitative and qualitative sustainability assessment methods. Representatives of governments, NGOs, certifying partnerships, and farmers' organizations have expressed a willingness to participate in the project and its multi-stakeholder workshops

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