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IIASA and Iran

Introduction

This is a background briefing on interactions between IIASA and Iran since 2006. It summarizes recent research collaborations and the participation of Iranian doctoral students in IIASA's capacity building activities along with listing the publication output from these joint activities.

Recent Research Collaborations with Iran

Increasing resilience to earthquakes

IIASA's risk experts analyze how to increase resilience against a range of hazards, including earthquakes. Almost all parts of Iran are seismic hazard prone areas and due to the low quality of constructions as well as the increase of exposure in urban areas, recent earthquakes have caused unacceptable huge losses, both in human and economic terms. A collaboration between researchers at IIASA, the International Institute of Earthquake Engineering and Seismology (IIEES), and the Islamic Azad University modeled the risks and losses to property owners in Shiraz in the event of an earthquake. This study subsequently informed an analysis of possible insurance schemes to both protect these property owners and encourage them to undertake proactive risk reduction measures to minimize future losses.

Water management in Iran

Iran faces a serious and worsening water crisis which greatly impacts its agricultural productivity. Ongoing collaborations between researchers at IIASA, Ramin Agricultural and Natural Resources University, and Shiraz University have explored the water crisis from multiple angles. Joint studies have investigated (1) water governance, (2) the inter-related risks to Iranian farmers of droughts, (3) new approaches to water management, (4) how Iranian farmers behave in relation to water, (5) and their views on crop insurance.

Projecting demographic change in Iran

IIASA's demographers study and project the changing composition of population for all countries of the world. Researchers from IIASA, the Iranian Ministry of Health, and the University of Tehran have collaborated to analyze the rapid fertility decline in Iran along with its link to the increase in levels of education in the Islamic Republic.

IIASA's interdisciplinary setting has always encouraged its demographers to research beyond the traditional boundaries of demography and to explore how changes in society, economy, and the natural environment influence the health and mortality, migratory patterns, and reproductive behavior of human society. Two recent innovative examples of this broader approach are:

- The development of research methods to project population by level of education and so explore the implications of different education policies on a country's future fertility, life expectancy, migration, and population level as well as economic growth and ability to adapt to climate change. In 2014 IIASA published the first projections of educational attainment by age and sex for 195 countries with *Oxford University Press*. Findings for Iran show how different policies over the next few decades could lead to the country's 2010 population of 74 million increasing to 122 million by 2100 or falling to around 63 million.
- A collaboration with a researcher from the University of Tehran assessed the association between improving education levels and the enhancement of democracy across 120 countries.

New Research Methods

Ongoing collaborations with an Iranian who joins IIASA's research staff in February 2015 are developing new research methods to explore sustainability. A recent study applied an ecological information-based approach, which incorporates both intensive and extensive dimensions of sustainability, to quantify the sustainability of economic trade networks in the areas of oil, iron, steel, virtual water and foreign direct investment among others.

Toward a Sustainable Energy Future

Senior energy experts from IIASA and the University of Tehran collaborated on a report, published by the InterAcademy Council and commissioned by the governments of Brazil and China, identifying and detailing the scientific consensus framework for directing global energy development. *Lighting the way: Toward a sustainable energy* future laid out the science, technology and policy roadmap for developing energy resources to drive economic growth in both developed and developing countries while also securing climate protection and global development goals. The project ran from 2005 to 2007.

Dialog sessions on Caspian Sea issues

The Caspian Sea is the world's largest inland body of water and a major source of oil and gas. It is also a potential site of conflict due to growing competition for its resources and because it's international legal status and maritime boundaries remain undefined. Between 2006 and 2008, IIASA researchers organized a series of dialog sessions among representatives of the five littoral states of the Caspian Sea (i.e. Azerbaijan, Iran, Kazakhstan, Russia, and Turkmenistan). The purpose of the conferences were twofold: (1) to provide a forum for the Caspian states to talk informally about issues of common interest that they rarely discuss due to preoccupation with the contentious issues of maritime boundaries and security, and (2) to prepare the terrain for productive discussions on these issues. Researchers from IIASA and other organizations presented the latest scientific advances on pollution, fish stocks, and water related to the Caspian Sea. The first Caspian Dialogue was held in Istanbul in 2006, the second in Baku in 2007, and the third in Aktau, Kazakhstan in 2008. All five of the Caspian countries participated.

Iranian Participation in IIASA Capacity Building Activities

Young Scientists Summer Program

The Young Scientists Summer Program (YSSP) develops the research skills and networks of talented PhD students. Program participants conduct independent research within the Institute's research programs under the guidance of IIASA scientific staff. Since 2006 the following seven Iranian students have participated in this program:

Kiarash Nasserasadi (YSSP '06 & International Institute of Earthquake Engineering and Seismology) assessed suitable and cost effective methods for managing or reducing the higher-order economic impacts of earthquakes on oil-related industrial facilities.

Naghmeh Pakdellahij (YSSP '13 & Islamic Azad University) researched the design of an effective earthquake insurance plan for the Shiraz metropolitan area in the south of Iran.

Mehdi Sadeghi (YSSP '13 & Islamic Azad University) undertook earthquake risk modeling to evaluate different mitigation measures to reduce losses to property owners in the Shiraz metropolitan area.

The following Iranian doctoral students were all studying their PhD outside Iran:

Hamed Ghoddusi (YSSP '10 & Vienna Graduate School of Finance), an Iranian national, explored extending IIASA's energy model, MESSAGE, to incorporate the effect of financial constraints on future energy supply and demand.

Faridoddin Karimi (YSSP '14 & University of Helsinki), an Iranian national, developed a framework to analyze the role of socio-cultural factors in risk perceptions concerning carbon capture and storage.

Ali Kharazi (YSSP '12 & University of Tokyo), an Iranian national, explored whether and why the sustainability of economic networks tends to be more dependent upon the resiliency or the efficiency of the network.

Soleiman Mohammadi Limaei (YSSP '06 & Swedish University of Agricultural Sciences), an Iranian national, worked on optimal harvest decisions in uneven-aged forests under risk and the application of game theory for the timber and product markets.

Regional Young Scientists Summer Program

In 2012 IIASA launched its first regional YSSP called the Southern African Young Scientists Summer Program (SA-YSSP). The Program is organized jointly by the South African National Research Foundation, the South African Department of Science and Technology, the University of the Free State in Bloemfontein, South Africa, and IIASA. The following Iranian has participated in the program:

Amin Masoumzadeh (SA-YSSP '12/13 & Sharif University of Technology) researched optimal economic growth under environmental constraints.

Training Workshops

IIASA's demographers gave a training workshop, "Training Course on Modern Methods of Population Projections" to staff from the Population Division of the Statistical Centre of Iran at the Statistical Research and Training Centre in Tehran in May 2014. The course was funded by the United Nations Population Fund (UNFPA).

Scientific Exchange with Iran

In addition to the research and capacity building activities mentioned above, scientific exchange takes place through IIASA employing Iranian researchers, IIASA researchers visiting Iran and Iranians visiting IIASA:

Research Partners

IIASA researchers have collaborated with a range of individual researchers in Iran who are affiliated to the following organizations in Iran:

International Institute of Earthquake Engineering and Seismology (IIEES)

Islamic Azad University (IAU)

National Institute for Genetic Engineering and Biotechnology (NIGEB)

Ramin Agricultural and Natural Resources University

Research Institute of Forests and Rangelands

Sharif University of Technology

Shiraz University

Statistical Centre of Iran (SCI)

University of Tehran

University of Zanjan

Iranian Employees

Three Iranian researchers have been employed as researchers at IIASA since 2006: Ghoddusi Hamed (2011), Yazdanpanah Masoud (2010-15), and Shadkam Torbati Somayeh (2012-13).

Iranian Visitors

Nine Iranian have visited IIASA and a further sixteen have participated in IIASA organized events since 2006.

Travel to Iran

Three IIASA researchers have visited Iran since 2006 to (1) give a presentation on “Earthquake, economy and insurance” at IIEES, (2) to develop a research collaboration on fisheries-induced evolution in sturgeons in the Caspian Sea, and (3) to teach a course at the Statistical Research and Training Centre in Tehran.

Publications relevant to IIASA-Iranian Collaborations since 2006

The publication list contains only publications authored by IIASA-affiliated researchers and:

- About Iran, or
- the IIASA author is a national of Iran, or
- the IIASA author has collaborated with a researcher based at an institute in Iran.

2015

1. Pakdel-Lahiji, N., Hochrainer-Stigler, S., Ghafory-Ashtiany, M. and Sadeghi, M. (2015). Consequences of Financial Vulnerability and Modeling Uncertainties to the Affordability of Earthquake Insurance Systems: A case study for Shiraz city, Iran (Forthcoming). *Geneva Risk and Insurance Review: Issues and Practices.*
2. Yazdanpanah M, Fourozani M & Hojjati M (2015). Willingness of Iranian young adults to eat organic foods: Application of the Health Belief Model. *Food Quality and Preference*, 41:75-83.

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3. Pakdel-Lahiji N, Hochrainer-Stigler S, Ghafory-Ashtiany M & Sadeghi M (2014). Risk management strategies for managing natural disaster risks: A case study in Shiraz City, Iran. In: *Proceedings, 10th U.S. National Conference on Earthquake Engineering: Frontiers of Earthquake Engineering*. 21-25 July 2014, Anchorage, Alaska, USA.
4. Sadeghi M, Hochrainer-Stigler S, Pakdel-Lahiji N & Ghafori-Ashtiany M (2014). Earthquake risk modeling for the evaluation of losses to property owners in the metropolitan area of Shiraz. In: *Proceedings, 10th U.S. National Conference on Earthquake Engineering: Frontiers of Earthquake Engineering*. 21-25 July 2014, Anchorage, Alaska, USA.
5. Yazdanpanah M, Hayati D, Hochrainer-Stigler S & Zamani GH (2014). Understanding farmers' intention and behavior regarding water conservation in the Middle-East and North Africa: A case study in Iran. *Journal of Environmental Management*, 135:63-72
6. Yazdanpanah M, Hayati D, Thompson M, Zamani GH & Monfared N (2014). Policy and plural responsiveness taking constructive account of the ways in which Iranian farmers think about and behave in relation to water. *Journal of Hydrology*, 514:347-357

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7. Kharrazi A, Rovenskaya E, Fath BD, Yarime M, Kraines S (2013). Quantifying the sustainability of economic resource networks: An ecological information-based approach. *Ecological Economics*, 90:177-186
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10. Yazdanpanah M, Monfared N & Hochrainer-Stigler S (2013). Inter-related effects due to droughts for rural populations: A qualitative field study for farmers in Iran. *International Journal of Mass Emergencies and Disasters (IJMED)*, 31(2):106-129.
11. Yazdanpanah M, Thompson M, Hayati D & Zamani GH (2013). A new enemy at the gate: Tackling Iran's water super-crisis by way of a transition from government to governance. *Progress in Development Studies*, 13(3):177-194.
12. Yazdanpanah M, Zamani GH, Hochrainer-Stigler S, Monfared N & Yaghoubi J (2013). Measuring satisfaction of crop insurance - A modified American customer satisfaction model approach applied to Iranian farmers. *International Journal of Disaster Risk Reduction*, 5:19-27

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13. Lim SS, Vos T, Flaxman AD, Danaei G, Shibuya K, Adair-Rohani H, Amann M, Anderson HR, Andrews KG, Aryee M, Atkinson C, Bacchus LJ, Bahalim AN, Balakrishnan K, Balmes J, Barker-Collo S, Baxter A, Bell ML, Blore JD, Blyth F, Bonner C, Borges G, Bourne R, Boussinesq M, Brauer M, Brooks P, Bruce NG, Brunekreef B, Bryan-Hancock C, Bucello C, Buchbinder R, Bull F, Burnett RT, Byers TE, Calabria B, Carapetis J, Carnahan E, Chafe Z, Charlson F, Chen H, Chen JS, Cheng AT-A, Child JC, Cohen A, Colson KE, Cowie BC, Darby S, Darling S, Davis A, Degenhardt L, Dentener F, Des Jarlais DC, Devries K, Dherani, M, Ding, EL, Dorsey, ER, Driscoll, T, Edmond, K, Ali, SE, Engell, RE, Erwin, PJ, Fahimi, S, Falder, G, Farzadfar, F, Ferrari, A, Finucane, MM, Flaxman, S, Fowkes, FGR, Freedman, G, Freeman, MK, Gakidou, E, Ghosh, S, Giovannucci, E, Gmel, G, Graham, K, Grainger, R, Grant, B, Gunnell, D, Gutierrez, HR, Hall, W, Hoek, HW, Hogan, A, Hosgood III, HD, Hoy, D, Hu, H, Hubbell, BJ, Hutchings, SJ, Ibeanusi, SE, Jacklyn, GL, Jasrasaria, R, Jonas, JB, Kan, H, Kanis, JA, Kassebaum, N, Kawakami, N, Khang, Y-H, Khatibzadeh, S, Khoo, J-P, Kok, C, Laden, F, Lalloo, R, Lan, Q, Lathlean, T, Leasher, JL, Leigh, J, Li, Y, Lin, JK, Lipshultz, SE, London, S, Lozano, R, Lu, Y, Mak, J, Malekzadeh, R, Mallinger, L, Marcenes, W, March, L, Marks, R, Martin, R, McGale, P, McGrath, J, Mehta, S, Mensah, GA, Merriman, TR, Micha, R, Michaud, C, Mishra, V, Hanafiah, KM, Mokdad, AA, Morawska, L, Mozaffarian, D, Murphy, T, Naghavi, M, Neal, B, Nelson, PK, Nolla, JM, Norman, R, Olives, C, Omer, SB, Orchard, J, Osborne, R, Ostro, B, Page, A, Pandey, KD, Parry, CDH, Passmore, E, Patra, J, Pearce, N, Pelizzari, PM, Petzold, M, Phillips, MR, Pope, D, Pope III, CA, Powles, J, Rao, M, Razavi, H, Rehfuess, EA, Rehm, JT, Ritz, B, Rivara, FP, Roberts, T, Robinson, C, Rodriguez-Portales, JA, Romieu, I, Room, R, Rosenfeld, LC, Roy, A, Rushton, L, Salomon, JA, Sampson, U, Sanchez-Riera, L, Sanman, E, Sapkota, A, Seedat, S, Shi, P, Shield, K, Shivakoti, R, Singh, GM, Sleet, DA, Smith, E, Smith, KR, Stapelberg, NJC, Steenland, K, Stöckl, H, Stovner, LJ, Straif, K, Straney, L, Thurston, GD, Tran, JH, Van Dingenen, R, Van Donkelaar, A, Veerman, JL, Vijayakumar, L, Weintraub, R, Weissman, MM, White, RA, Whiteford, H, Wiersma, ST, Wilkinson, JD, Williams, HC, Williams, W, Wilson, N, Woolf, AD, Yip, P, Zielinski, JM, Lopez, AD, Murray, CJL, Ezzati, M. A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: A

systematic analysis for the Global Burden of Disease Study 2010 (2012) *The Lancet*, 380 (9859): 2224-2260.

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18. Chu S, Goldemberg J, Arungu-Olende S, El-Ashry M, Davis G, Nakicenovic N, Shafie-Pour M, et al. (2007). *Lighting the Way: Toward a Sustainable Energy Future*. InterAcademy Council, Amsterdam, Netherlands.