

cation will be ideal for every type of RE system. Some of the variables that will affect suitability include the *biodiversity ranking* of a given location, its particular ecological and geographical situation, but also the socio-economic needs. The project will draw on and further develop tools currently used by the project partners, such as IIASA's geographically explicit BeWhere model (e.g. Leduc et al. 2008) for optimal RE deployment and the open source GIS BIOMASFOR (Sacchelli et al. 2013) to assess the exploitability of forest biomass. The partners will expand the models to include hydro-, wind, and solar power. To analyse economic and ecological trade-offs, a *marginal protection cost curve* will be developed, which will be estimated using the model. This will take into account the protection status or biodiversity ranking of a location when calculating the per-unit costs of RE production. In areas with higher levels of biodiversity, energy production would be more costly than in those of relatively low biodiversity ranking. The use of such a tool will allow decision-makers to obtain full information about costs and benefits and a good representation of the trade-offs involved. The tool will also integrate the map-based online survey tool Jecami, which was developed within the ETC Alpine Space project ECONNECT (<http://www.econnectproject.eu>) to assess high biodiversity areas and ecological connectivity between them.

The project will test the developed tools in five pilot regions, with a focus on the areas' particularities: Alpi Marittime Nature Park (Italy), Bavaria (Germany), Triglav National Park (Slovenia), Veneto Region (Italy) and Vorarlberg (Austria). In general, activities within the pilot areas will test the instruments while involving local communities and integrating them into strategic environmental assessment processes for a choice of RE plans.

If the new tools can provide the basis within the pilot areas for balancing the demands for RE and for sourcing from those regions with the need to conserve their outstanding natural treasures, this would be an indicator of success for the recharge.green project.

The project began in October 2012 and will run until June 2015.

For more information: <http://www.recharge-green.eu>

References

Ascough, J.C., H.D. Rector, D.L. Hoag, G.S. McMaster, B.C. Vandenberg, M.J. Shaffer, M.A. Weltz & L.R. Ahjua 2002. Multicriteria spatial decision support systems for agriculture: Overview, applications, and future research directions. In: *Integrated assessment and decision support proceedings of the 1st Biennial Meeting of the IEMSS*: 175–180.

Atkinson, G., I. Bateman & S. Mourato 2012. Recent advances in the valuation of ecosystem services and biodiversity. *Oxford Review of Economic Policy* 28 (1): 22–47.



Figure 3 – Wind power plant. © Kenneth Brockmann pixelio.de

BMU 2012. *Gesetz für den Vorrang Erneuerbarer Energien (Erneuerbare-Energien-Gesetz, EEG 2012)*. Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit.

Bund Naturschutz in Bayern e.V. 2012. Einstimmig beschlossene Resolution der BN-Delegiertenversammlung am 29. April 2012 in Günzburg. Schutz der Fließgewässer in Bayern: Kein weiterer Ausbau der Wasserkraft. Available at: http://www.bund-naturschutz.de/uploads/media/DV_Resolution-gegen-Wasserkraftausbau_DV-2012_12-04-29.pdf (accessed: 11/03/13)

Braat, L.C. & R. De Groot 2012. The ecosystem services agenda: bridging the worlds of natural science and economics, conservation and development, and public and private policy. *Ecosystem Services* 1 (1): 4–15.

Daily, G.C., S. Polasky, J. Goldstein, P.M. Kareiva, H.A. Mooney, L. Pejchar, T.H. Ricketts, J. Salzman & R. Shallenberger 2009. Ecosystem services in decision making: time to deliver doi:10.1890/080025. *Frontiers in Ecology and the Environment* 7 (1): 21–28.

Dempsey, J. & J. Ewing 2011. Germany to Close All Nuclear Plants by 2022. *NYTimes.com*. Available at: http://www.nytimes.com/2011/05/31/world/europe/31germany.html?_r=1& (accessed: 09/01/13)

EC 2009. Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC Text with

EEA relevance. *Official Journal of the European Union* L 140: 16–62.

EC 2005. Protocol on the implementation of the Alpine Convention of 1991 in the field of energy. *Official Journal of the European Union* L 337: 36–41.

EP 2012. European Parliament resolution of 20 April 2012 on our life insurance, our natural capital: an EU biodiversity strategy to 2020 (2011/2307(INI)) Available at: http://ec.europa.eu/environment/nature/biodiversity/comm2006/pdf/EP_resolution_april2012.pdf (accessed: 11/03/13)

Hooper, D.U., E.C. Adair, B.J. Cardinale, J.E.K. Byrnes, B.A. Hungate, K.L. Matulich, A. Gonzalez, J.E. Duffy, L. Gamfeldt & M.I. O'Connor 2012. A global synthesis reveals biodiversity loss as a major driver of ecosystem change. *Nature* 486: 105–108.

IPCC 2007. *Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change*. Pachauri, R.K. & A. Reisinger (eds.). Geneva, Switzerland: Intergovernmental Panel on Climate Change (IPCC).

Lang, M. & U. Mutschler 2012. German Feed-in Tariffs 2012. German Energy Blog. Available at: http://www.germanenergyblog.de/?page_id=8617 (accessed: 25/12/12)

Lassen, B. & S. Savoia 2005. *European Alpine Programme. Ecoregion Conservation Plan for the Alps*. Bellinzona, Switzerland: WWF.

Leduc, S., D. Schwab, E. Dotzauer, E. Schmid & M. Obersteiner 2008. Optimal location of wood gasification plants for methanol production with heat recovery. *International Journal of Energy Research* 32 (12): 1080–1091.

MA 2005. *Ecosystems and Human Well-being: Biodiversity Synthesis. Millennium Ecosystem Assessment*. World Resources Institute (WRI) (ed.). Washington, DC: World Resources Institute.

Martin-Lopez, B., C. Montes & J. Benayas 2008. Economic Valuation of Biodiversity Conservation: the Meaning of Numbers. *Conservation Biology* 22 (3): 624–635.

Midgley, G.F. 2012. Biodiversity and Ecosystem Function. *Science* 335 (6065): 174–175.

Pianigiani, G. 2011. Italy: Nuclear Plants On Hold. *NYTimes.com*. Available at: <http://www.nytimes.com/2011/04/20/world/europe/20briefs-italy.html> (accessed 09/01/13)

Sacchelli, S., I. De Meo & A. Paletto 2013. Bioenergy production and forest multifunctionality: A trade-off analysis using multiscale GIS model in a case study in Italy. *Applied Energy* 104: 10–20.

Sukhdev, P., H. Wittmer, C. Schröter-Schlaack, C. Nesshöver, J. Bishop, P. ten Brink, H. Gundimeda, P. Kumar & B. Simmons 2010. *Mainstreaming the Economics of Nature: A synthesis of the approach, conclusions and recommendations of TEEB*.

Authors

Karin Svadlenak-Gomez¹

holds an MSc in Biodiversity Conservation and Management from the University of London. She has been with the Research Institute of Wildlife Ecology since 2011. She is experienced in sustainable development and conservation issues in an international context. Email: karin.svadlenak-gomez@fiwi.at

Marianne Badura²

graduated in landscape planning and GIS at the University of Applied Sciences Weihenstephan and the University of Salzburg. In 1998 she set up her own company blue! and has been involved in it as managing partner and as expert in landscape ecology and European environmental topics. Email: m.badura@the-blue.net

Florian Kraxner³

is Deputy Leader of IIASA's ESM Program. He graduated in forestry with specialization in mountain risk engineering and watershed management from the University of Natural Resources and Life Sciences, Vienna. His current research interests are: land-use change, sustainable forestry and bioenergy. Email: kraxner@iiasa.ac.at

Sabine Fuss³

completed her PhD in economics at Maastricht University and UNU-MERIT. Since 2007 she has been working at the International IIASA's ESM Program. Her research interests include: decision making under uncertainty, energy planning, natural resource management and climate change. Email: fuss@iiasa.ac.at

Daniele Vettorato⁴

coordinates the research group in Energy Strategies and Planning at the EURAC Institute for Renewable Energy. He also collaborates with Trento University and is a member of the International Society of Cities and Regional Planners. He has a PhD in Environmental Engineering – Sustainable Planning (Energy). Email: daniele.vettorato@eurac.edu

Chris Walzer¹

is a veterinarian by training. He holds the Chair for Conservation Medicine and is Co-director of the Research Institute of Wildlife Ecology. His internationally recognized wildlife expertise has been gained from combined years of work and research in Europe, Asia and Africa. Email: chris.walzer@fiwi.at

¹ Research Institute of Wildlife Ecology, Vetmeduni Vienna

² blue! advancing european projects

³ International Institute for Applied Systems Analysis

⁴ EURAC, Bolzano, Institute for Renewable Energy