

GERICS Publications (peer reviewed)

2021

Ban N., Caillaud C., Coppola E., Pichelli E., Sobolowski S., Adinolfi M., Ahrens B., Alias A., Anders I., Bastin S., Belušić D., Berthou S., Brisson E., Cardoso R.M., Chan S.C., Christensen O.B., Fernández J., Fita L., **Frisius T.**, Gašparac G., Giorgi F., Goergen K., Haugen J.E., Hodnebrog Ø., Kartsios S., Katragkou E., Kendon E.J., Keuler K., Lavin-Gullon A., Lenderink G., Leutwyler D., Lorenz T., Maraun D., Mercogliano P., Milovac J., Panitz H.-J., Raffa M., **Remedio A.R.**, Schär C., Soares P.M.M., Srnec L., Steensen B.M., Stocchi P., Tölle M.H., Truhetz H., Vergara-Temprado J., de Vries H., Warrach-Sagi K., Wulfmeyer V., Zander M.J. (2021): The first multi-model ensemble of regional climate simulations at kilometer-scale resolution, part I: evaluation of precipitation. *Climate Dynamics*, 57(1), 275-302, DOI: 10.1007/s00382-021-05708-w

Breil M., Davin E.L., **Rechid D.** (2021): What determines the sign of the evapotranspiration response to afforestation in European summer? *Biogeosciences*, 18(4), 1499-1510, DOI: 10.5194/bg-18-1499-2021

Brovkin V., Brook E., Williams J.W., **Bathiany S.**, Lenton T.M., Barton M., DeConto R.M., Donges J.F., Ganopolski A., McManus J., Praetorius S., de Vernal A., Abe-Ouchi A., Cheng H., Claussen M., Crucifix M., Gallopín G., Iglesias V., Kaufman D.S., Kleinen T., Lambert F., van der Leeuw S., Liddy H., Loutre M.-F., McGee D., Rehfeld K., Rhodes R., Seddon A.W.R., Trauth M.H., Vanderveken L., Yu Z. (2021): Past abrupt changes, tipping points and cascading impacts in the Earth system. *Nature Geoscience*, 14(8), 550-558, DOI: 10.1038/s41561-021-00790-5

Bühler M.M., Sebald C., **Rechid D.**, Baier E., Michalski A., Rothstein B., Nübel K., Metzner M., Schwieger V., **Harris J.A.**, **Jacob D.**, Köhler L., In Het Panhuis G., Rodríguez Tejeda R.C., Herrmann M., Buziek G. (2021): Application of copernicus data for climate-relevant urban planning using the example of water, heat, and vegetation. *Remote Sensing*, 13(18), 3634, DOI: 10.3390/rs13183634

Celliers L., Costa M.M., Williams D.S., Rosendo S. (2021): The 'last mile' for climate data supporting local adaptation. *Global Sustainability*, 4, e14, DOI: 10.1017/sus.2021.12

Celliers L., Scott D., Ngcoya M., Taljaard S. (2021): Negotiation of knowledge for coastal management? Reflections from a transdisciplinary experiment in South Africa. *Humanities and Social Sciences Communications*, 8(1), 207, DOI: 10.1057/s41599-021-00887-7

Coppola E., Raffaele F., Giorgi F., Giuliani G., Xuejie G., Ciarlo J.M., Sines T.R., Torres-Alavez J.A., Das S., di Sante F., Pichelli E., Glazer R., Müller S.K., Abba Omar S., Ashfaq M., Bukovsky M., Im E.-S., **Jacob D.**, **Teichmann C.**, **Remedio A.**, **Remke T.**, Kriegsmann A., **Bülow K.**, **Weber T.**, **Buntemeyer L.**, **Sieck K.**, **Rechid D.**

(2021): Climate hazard indices projections based on CORDEX-CORE, CMIP5 and CMIP6 ensemble. *Climate Dynamics*, 57, 1293-1383, DOI: 10.1007/s00382-021-05640-z

Cremades R., Sanchez-Plaza A., Hewitt R.J., Mitter H., Baggio J.A., Olazabal M., Broekman A., Kropf B., Tudose N.C. (2021): Guiding cities under increased droughts: The limits to sustainable urban futures. *Ecological Economics*, 189, 107140, DOI: 10.1016/j.ecolecon.2021.107140

de la Vara A., Cabos W., **Sein D.V., Teichmann C., Jacob D.** (2021): Impact of air-sea coupling on the climate change signal over the Iberian Peninsula. *Climate Dynamics*, 57, 2325-2349, DOI: 10.1007/s00382-021-05812-x

Dreier N., Nehlsen E., Fröhle P., **Rechid D., Bouwer L.M., Pfeifer S.** (2021): Future changes in wave conditions at the german baltic sea coast based on a hybrid approach using an ensemble of regional climate change projections. *Water*, 13(2), 167, DOI: 10.3390/w13020167

Egerer S., Cotera R.V., Celliers L., Costa M.M. (2021): A leverage points analysis of a qualitative system dynamics model for climate change adaptation in agriculture. *Agricultural Systems*, 189, 103052, DOI: 10.1016/j.agsy.2021.103052

Ferreira S.J.F., Pinel S., Ríos-Villamizar E.A., Miranda S.Á.F., Pascoaloto D., Vital A.R.T., Monteiro M.T.F., da Silva M.S.R., da Cunha T.R.B., dos Santos A.S., **Bender S.**, da Cunha H.B. (2021): *Environmental Earth Sciences*, 80(8), 316, DOI: 10.1007/s12665-021-09621-7

Fotso-Nguemo T.C., Vondou D.A., Diallo I., Diedhiou A., **Weber T.**, Tanessong R.S., Nghonda J.P., Yepdo Z.D. (2021): Potential impact of 1.5, 2 and 3 °C global warming levels on heat and discomfort indices changes over Central Africa. *Science of the Total Environment*, 804, 150099, DOI: 10.1016/j.scitotenv.2021.150099

Giordano R., **Manez-Costa M.**, Pagano A., Mayor Rodriguez B., Zorrilla-Miras P., **Gomez E.**, Lopez-Gunn E. (2021): Combining social network analysis and agent-based model for enabling nature-based solution implementation: The case of Medina del Campo (Spain). *Science of the Total Environment*, 801, 149734, DOI: 10.1016/j.scitotenv.2021.149734

Giorgi F., Coppola E., **Jacob D., Teichmann C.**, Abba Omar S., Ashfaq M., Ban N., **Bulow K.**, Bukovsky M., **Buntemeyer L.**, Tereza Cavazos T., Ciarlo J., Perfirio da Rocha R., Das S., Di Sante F., Evans J. P., Gao X., Giuliani G., Glazer R.H., **Hoffmann P.**, Im E.S., **Langendijk G., Lierhammer L.**, Llopert M., Mueller S., Luna-Nino R., Nogherotto R., Pichelli E., Raffaele F., Reboita M., **Rechid D., Remedio A., Remke T.**, Sawadogo W., **Sieck K.**, Torres-Alavez J.A., **Weber T.** (2021): The CORDEX-CORE EXP-I initiative: Description and highlight results from the initial analysis. *Bulletin of the American Meteorological Society*, 103(2), E293-E310, DOI: 10.1175/BAMS-D-21-0119.1

Giorgi F., Coppola F., **Teichmann C., Jacob D.** (2021): Editorial for the CORDEX-CORE Experiment I Special Issue. *Climate Dynamics*, 57, 1265-1268, DOI: 10.1007/s00382-021-05902-w

Gómez Martín E., Máñez Costa M., Egerer S., Schneider Uwe A. (2021): Assessing the long-term effectiveness of Nature-Based Solutions under different climate change scenarios. *Science of The Total Environment*, 794, 148515, DOI: 10.1016/j.scitotenv.2021.148515

Groth M. (2021): EU Transport Policy: Much potential, implementation open [EU-Verkehrspolitik: Viel Potenzial, Umsetzung offen]. *Wirtschaftsdienst*, 101(8), 581, DOI: 10.1007/s10273-021-2970-x

Groth M., Bender S., Groth B.J. (2021): Rechtlicher Rahmen der Anpassung an die Folgen des Klimawandels im urbanen Raum. *Zeitschrift für Umweltpolitik & Umweltrecht (ZfU)*, 4, 385-414

Hedayatnia H., Top S., Caluwaerts S., **Kotova L.**, Steeman M., Van Den Bossche N. (2021): Evaluation of alaro-0 and remo regional climate models over iran focusing on building material degradation criteria. *Buildings*, 11(8), 376, DOI: 10.3390/buildings11080376

Hewitt C.D., Guglielmo F., Joussaume S., Bessembinder J., Christel I., Doblas-Reyes F. J., Djurdjevic V., Garrett N., Kjellström E., Krzic A., **Máñez Costa M.**, St. Clair A.L. (2021): Recommendations for Future Research Priorities for Climate Modeling and Climate Services. *Bulletin of the American Meteorological Society*, 102(3), E578-E588, DOI: 10.1175/BAMS-D-20-0103.1

Hewitt C., Bessembinder J., Buonocore M., Dunbar T., Garrett N., **Kotova L.**, New S., Newton P., Parfitt R., Buontempo C., Doblas-Reyes F., Guglielmo F., **Jacob D.**, Kjellström E., Krzic A., Martins H., Pietrosanti A., Terrado M. (2021): Coordination of Europe's climate-related knowledge base: networking and collaborating through interactive events, social media and focussed groups. *Climate Services*, 24, 100264, DOI: 10.1016/j.cliser.2021.100264

Jacob D., Görl K., Groth M., Haustein K., Rechid D., Sieck K., Wolff M. (2021): Naturwissenschaftlicher Hintergrund der Erderwärmung: Wo stehen wir zurzeit? *Wirtschaftsdienst*, 101(5), 330-334, DOI: 10.1007/s10273-021-2911-8

Kovalevsky D.V., Volchenkov D., Scheffran J. (2021): Cities on the coast and patterns of movement between population growth and diffusion. *Entropy*, 23(8), 1041, DOI: 10.3390/e23081041

Kovalevsky D.; Máñez Costa M. (2021): Demand behaviour for weather index insurance products in regions prone to agricultural droughts. *Discontinuity, Nonlinearity, and Complexity*, 10(4), 765-780, DOI: 10.5890/DNC.2021.12.015

Krefis A.C., Fischereit J., **Hoffmann P.**, Sorbe C., Pinnschmidt H., Augustin M., Augustin J. (2021): Predictors of utilization of cardiovascular and respiratory emergency department visits - What impact does the environment have? [Prädiktoren der Inanspruchnahme von kardiovaskulären und respiratorischen Notfallaufnahmen - Welchen Einfluss hat die Umwelt?]. *Gesundheitswesen*, 83(2), 105-113, DOI: 10.1055/a-1005-7161

Kumar P., Debele S.E., Sahani J., Rawat N., Marti-Cardona B., Alfieri S.M., Basu B., Basu A.S., **Bowyer P.**, Charizopoulos N., Gallotti G., Jaakkko J., Leo L.S., Loupis M., Menenti M., Mickovski S.B., Mun S.-J., Gonzalez-Ollauri A., **Pfeiffer J.**, Pilla F., **Pröll J.**, Rutzinger M., Santo M.A., Sannigrahi S., Spyrou C., Tuomenvirta H., Zieher T. (2021): Nature-based solutions efficiency evaluation against natural hazards: Modelling methods, advantages and limitations. *Science of the Total Environment*, 784, 147058, DOI: 10.1016/j.scitotenv.2021.147058

Kumar P., Debele S.E., Sahani J., Rawat N., Marti-Cardona B., Alfieri S.M., Basu B., Basu A.S., **Bowyer P.**, Charizopoulos N., Jaakkko J., Loupis M., Menenti M., Mickovski S.B., **Pfeiffer J.**, Pilla F., **Pröll J.**, Pulvirenti B., Rutzinger M., Sannigrahi S., Spyrou C., Tuomenvirta H., Vojinovic Z., Zieher T. (2021): An overview of monitoring methods for assessing the performance of nature-based solutions against natural hazards. *Earth-Science Reviews*, 217, 103603, DOI: 10.1016/j.earscirev.2021.103603

Langendijk G.S., Rechid D., Sieck K., Jacob D. (2021): Added value of convection-permitting simulations for understanding future urban humidity extremes: Case studies for Berlin and its surroundings. *Weather and Climate Extremes*, 33, 100367, DOI: 10.1016/j.wace.2021.100367

Li J., Fang F., **Steppeler J.**, Zhu J., Cheng Y., Wu X. (2021): Demonstration of a three-dimensional dynamically adaptive atmospheric dynamic framework for the simulation of mountain waves. *Meteorology and Atmospheric Physics*, 133, 1627-1645, DOI: 10.1007/s00703-021-00828-8

Martin M.A., Sendra O., Bastos A., Bauer N., Bertram C., Blenckner T., Bowen K., Brando P.M., Brodie R.T., Büchs M., Bustamante M., Chen D., Cleugh H., Dasgupta P., Denton F., Donges J.F., Donkor F.K., Duan H., Duarte C.M., Ebi K.L., Edwards C. M., Engel A., Fisher E., Fuss S., Gaertner J., Gettelman A., Girardin C.A.J., Golledge N.R., Green J.F., Grose M.R., Hashizume M., Hebden S., **Hepach H.**, Hirota M., Hsu H.H., Kojima S., Lele S., Lorek S., Lotze H.K., Matthews H.D., McCauley D., Mebratu D., Mengis N., Nolan R.H., Pihl E., Rahmstorf S., Redman A., Reid C.E., Rockström J., Rogelj J., Saunois M., Sayer L., Schlosser P., Sioen G. B., Spangenberg J. H., Stammer D., Sterner T.N.S., Stevens N., Thonicke K., Tian H., Winkelmann R., Woodcock J. (2021): Ten new insights in climate science 2021 - a horizon scan. *Global Sustainability*, 4, e25, 1-20, DOI: 10.1017/sus.2021.25

Mishra A.K., Kumar P., Dubey A.K., Javed A., Saharwardi M.S., Sein D.V., Martyanov S.D., **Jacob D.** (2021): Impact of horizontal resolution on monsoon precipitation for CORDEX-South Asia: A regional earth system model assessment. *Atmospheric Research*, 259, 105681, DOI: 10.1016/j.atmosres.2021.105681

Mülmenstädt J., Salzmann M., Kay J.E., Zelinka M.D., Ma P.-L., **Nam C.**, Kretzschmar J., Hörnig S., Quaas J. (2021): An underestimated negative cloud feedback from cloud lifetime changes. *Nature Climate Change*, 11(6), 508-513, DOI: 10.1038/s41558-021-01038-1

Peng Y., Liang E.Y., Scheffran J., Yan J., Li M., Jiang P., Wang Y., **Cremades R.** (2021): Livelihood transitions transformed households' carbon footprint in the Three Gorges

Reservoir area of China. *Journal of Cleaner Production*, 328, 129607, DOI: 10.1016/j.jclepro.2021.129607

Pihl E., Alfredsson E., Bengtsson M., Bowen K.J., Broto V.C., Chou K.T., Cleugh H., Ebi K.L., Edwards C.M., Fisher E., Friedlingstein P., Godoy-Faúndez A., Gupta M., Harrington A.R., Hayes K., Hayward B.M., Hebdon S.R., Hickmann T., Hugelius G., Ilyina T., Jackson R.B., Keenan T.F., Lambino R.A., Leuzinger S., Malmaeus M., McDonald R.I., McMichael C., Miller C.A., Muratori M., Nagabhatla N., Nagendra H., Passarello C., Penuelas J., Pongratz J., Rockström J., Romero-Lankao P., Roy J., Scaife A.A., Schlosser P., Schuur E., Scobie M., Sherwood S.C., Sioen G.B., Skovgaard J., Sobenes Obregon E.A., Sonntag S., Spangenberg J.H., Spijkers O., Srivastava L., Stammer D.B., Torres P.H.C., Turetsky M.R., Ukkola A.M., van Vuuren D.P., Voigt C., Wannous C., Zelinka M.D. (2021): 10 new insights in climate science 2020 – a horizon scan. *Global Sustainability*, 4, e5, DOI: 10.1017/sus.2021.2

Rayer Q., Haustein K., Walton P. (2021): Water insecurity and climate risk: Investment Impact of floods and droughts. In: Walker, T., Gramlich, D., Vico, K., Dumont-Bergeron, A. (eds) Water risk and its impact on the financial markets and society. *Palgrave Studies in Sustainable Business in Association with Future Earth*. 157-188, DOI: 10.1007/978-3-030-77650-3_6

Rodriguez-Lopez J.M., Schickhoff M., Sengupta S., Scheffran J. (2021): Technological and social networks of a pastoralist artificial society: agent-based modeling of mobility patterns. *Journal of Computational Social Science*, 4, 681-707, DOI: 10.1007/s42001-020-00100-w

Rölfer L., Liconti A., Prinz N., Klöcker C.A. (2021): Integrated Research for Integrated Ocean Management. *Frontiers in Marine Science*, 8, 693373, DOI: 10.3389/fmars.2021.693373

Rosenfelder M., Wussow M., Gust G., Cremades R., Neumann D. (2021): Predicting residential electricity consumption using aerial and street view images. *Applied Energy*, 301, 117407, DOI: 10.1016/j.apenergy.2021.117407

Rubio-Martin A., Mañez Costa M., Pulido-Velazquez M., García-Prats A., Celliers L., Llario F., Macian J. (2021): Structuring climate service co-creation using a business model approach. *Earth's Future*, 9(10), e2021EF002181, DOI: 10.1029/2021EF002181

Schütze A.A., Banning A., Bender S. (2021): Kartierung und Simulation von Überschwemmungsflächen in urbanen Räumen nach Starkregenereignissen. *Grundwasser - Zeitschrift der Fachsektion Hydrogeologie*, 26, 87-97, DOI: 10.1007/s00767-020-00470-y

Sieck K., Nam C., Bouwer L.M., Rechid D., Jacob D. (2021): Weather extremes over Europe under 1.5 and 2.0°C global warming from HAPPI regional climate ensemble simulations. *Earth System Dynamics*, 12(2), 457-468, DOI: 10.5194/esd-12-457-2021

Spinoni J., Barbosa P., Bucchignan E.I., Cassano J., Cavazos T., Cescatti A., Hesselbjerg Christensen J., Christensen O. B., Coppola E., Evans J., Forzieri G.,

Geyer B., Giorgi F., **Jacob D.**, Katzfey J., Koenigk T., Laprise R., Lennard C.J., Kurnaz M.L. , Li D., Llopart M., McCormick N., Naumann G., Nikulin G., Ozturk T., Panitz H.-J., Porfirio da Rocha R., Solman S.A., Syktus J., Tangang F., **Teichmann C.**, Vautard, R., Vogt J.V., Winger K., Zittis G., Dosio A. (2021): Global exposure of population and land-use to meteorological droughts under different warming levels and shared socioeconomic pathways: A coordinated regional climate downscaling experiment-based study. *International Journal of Climatology*, 41(15), 6825-6853, DOI: 10.1002/joc.7302

Spyrou C., Loupis M., Charizopoulos N., Apostolidou I., Mentzafou A., Varlas G., Papadopoulos A., Dimitriou E., Panga D., Gkeka L., **Bowyer P.**, **Pfeifer S.**, Debele S.E., Kumar P. (2021): Evaluating nature-based solution for flood reduction in spercheios river basin under current and future climate conditions. *Sustainability*, 13(7), 3885, DOI: 10.3390/su13073885

Stavi I., Paschalidou A., Kyriazopoulos A.P., Halbac-Cotoara-Zamfir R., Siad S.M., Suska-Malawska M., Savic D., Roque de Pinho J., Thalheimer L., **Williams D.S.**, Hashimshony-Yaffe N., van der Geest K., Cordovil C.M.d.S., Ficko A. (2021): Multidimensional food security nexus in drylands under the slow onset effects of climate change. *Land*, 10(12), 1350, DOI: 10.3390/land10121350

Stewart Ibarra A.M., Hewitt C., Winarto Y.T., Walker S., Keener V.W., Bayala J., Christel I., Bloomfield H., Halsnæs K., **Jacob D.**, Brasseur G.P., Haigh T., van den Hurk B. (2021): Resilience through climate services. *One Earth*, 4(8), 1050-1054, DOI: 10.1016/j.oneear.2021.08.002

Suhari M., **Dressel M.**, **Schuck-Zöller S.**, Held H. (2021): Challenges and best-practices of co-creation: A qualitative interview study in the field of climate services. *Climate Services*, 25, 100282, DOI: 10.1016/j.cliser.2021.100282

Swart R., **Celliers L.**, Collard M., Garcia Prats A., **Huang-Lachmann J.-T.**, Llario Sempere F., de Jong F., **Máñez Costa M.**, Martinez G., Pulido Velazquez M., Rubio Martín A., Segretier W., Stattner E., Timmermans W. (2021): Reframing climate services to support municipal and regional planning. *Climate Services*, 22, 100227, DOI: 10.1016/j.cliser.2021.100227

Tamoffo A.T., Amekudzi L.K., **Weber T.**, Vondou D.A., Yamba E.I., **Jacob, D.** (2021): Mechanisms of rainfall biases in two CORDEX-CORE regional climate models at rainfall peaks over Central Equatorial Africa. *Journal of Climate*, 35(2), 639-668, DOI: 10.1175/JCLI-D-21-0487.1

Thomas A., Theokritoff E., Lesnikowski A., Reckien D., Jagannathan K., **Cremades R.**, Campbell D., Joe E.T., Sitati A., Singh C., Segnon A.C., Pentz B., Musah-Surugu J.I., Mullin C.A., Mach K.J., Gichuki L., Galappaththi E., Chalastani V.I., Ajibade I., Ruiz-Diaz R., Grady C., Garschagen M., Ford J., Bowen K., Global Adaptation Mapping Initiative Team (2021): Global evidence of constraints and limits to human adaptation. *Regional Environmental Change*, 21(3), 85, DOI: 10.1007/s10113-021-01808-9

Top S., **Kotova L.**, De Cruz L., Aniskevich S., Bobylev L., De Troch R., Gnatiuk N., Gobin A., Hamdi R., Kriegsmann A., Reca Remedio A., Sakalli A., Van De Vyver H.,

Van Schaeybroeck B., Zandersons V., De Maeyer P., Termonia P., Caluwaerts S. (2021): Evaluation of regional climate models ALARO-0 and REMO2015 at 0.22° resolution over the CORDEX Central Asia domain. *Geoscientific Model Development*, 14(3), 1267-1293, DOI: 10.5194/gmd-14-1267-2021

Trümper S., Beck M.L. (2021): Klimakommunikation: Klimakommunikation - der lange Weg vom Wissen zur Umsetzung: Einleitung zum Schwerpunkt. *GAIA - Ecological Perspectives for Science and Society*, 30(3), 162-167, DOI: 10.14512/gaia.30.3.7

Trümper S., Beck M.L. (2021): Transformative Klimakommunikation: Veränderungsprozesse in Wissenschaft und Gesellschaft anstoßen. *GAIA - Ecological Perspectives for Science and Society*, 30(3), 161-161, DOI: 10.14512/gaia.30.3.7

Tudose N. C., **Cremades R.**, Broekman A., Sanchez-Plaza A., Mitter H., Marin M. (2021): Mainstreaming the nexus approach in climate services will enable coherent local and regional climate policies. *Advances in Climate Change Research*, 12(5), 753-755, DOI: 10.1016/j.accre.2021.08.005

Vautard R., Kadygrov N., Iles C., Boberg F., Buonomo E., **Bülow K.**, Coppola E., Corre L., van Meijgaard E., Nogherotto R., Sandstad M., Schwingshackl C., Somot S., Aalbers E., Christensen O.B., Ciarlo J.M., Demory M.-E., Giorgi F., **Jacob D.**, Jones R.G., Keuler K., Kjellström E., Lenderink G., Levavasseur G., Nikulin G., Sillmann J., Solidoro C., Sørland S.L., Steger C., Teichmann C., Warrach-Sagi K., Wulfmeyer V. (2021): Evaluation of the large EURO-CORDEX regional climate model ensemble. *Journal of Geophysical Research: Atmospheres*, 126(17), e2019JD032344, DOI: 10.1029/2019JD032344

Warszawski L., Kriegler E., Lenton T.M., Gaffney O., **Jacob D.**, Klingenfeld D., Koide R., Costa M.M., Messner D., Nakicenovic N., Schellnhuber H.J., Schlosser P., Takeuchi K., van der Leeuw S., Whiteman G., Rockström J. (2021): All options, not silver bullets, needed to limit global warming to 1.5°C: A scenario appraisal. *Environmental Research Letters*, 16(6), 64037, DOI: 10.1088/1748-9326/abfeec

Williams D.S., Jacob D. (2021): From participatory to inclusive climate services for enhancing societal uptake. *Climate Services*, 24, 100266, DOI: 10.1016/j.cliser.2021.100266

Wübbelmann T., Bender S., Burkhard B. (2021): The importance of regional climate and land use information for flood regulation ecosystem services modelling. *Landscape Online*, 88, 1-16, DOI: 10.3097/LO.202188