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RMA newsletter Spring 2017

Luc Doyen, Sébastien Lavaud, Anne-Sophie Masure

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RMA

The Resource Modeling Association is an international association of scientists working at the intersection of mathematical modeling, environmental science, and natural resource management. We formulate and analyze models to understand and inform the management of renewable and exhaustible resources. We are particularly concerned with the sustainable utilization of renewable resources and their vulnerability to anthropogenic and other disturbances.

RMA Newsletter

Spring 2017



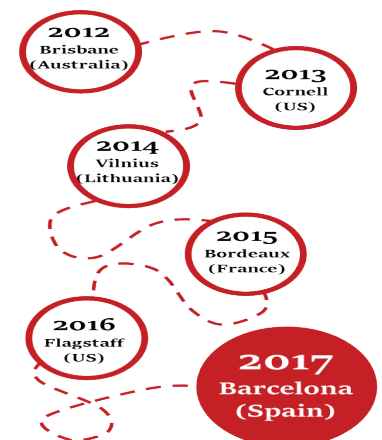
#WCNRM2017 by Pau Costa Foundation executive team

The 2017 World Conference on Natural Resource Modeling #WCNRM2017 will take place in less than 50 days (6-9 June 2017) in Barcelona (Spain). This edition of the World Conference on Natural Resource Modeling is co-organized by the Resource Modeling Association (RMA), Pau Costa Foundation (PCF) and the Universitat Politècnica de Catalunya (UPC). As for past editions, the World

Conference on Natural Resource Modeling will bring together scientists and stakeholders interested in mathematical and numerical modeling of renewable and exhaustible resources. The specific topic of this year's conference is "Vulnerability and Resilience of Socio-ecological Systems". The importance of this topic raises from the need to address the

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Past International Editions



IPBES Scenarios & Models,
a short review | p. 3

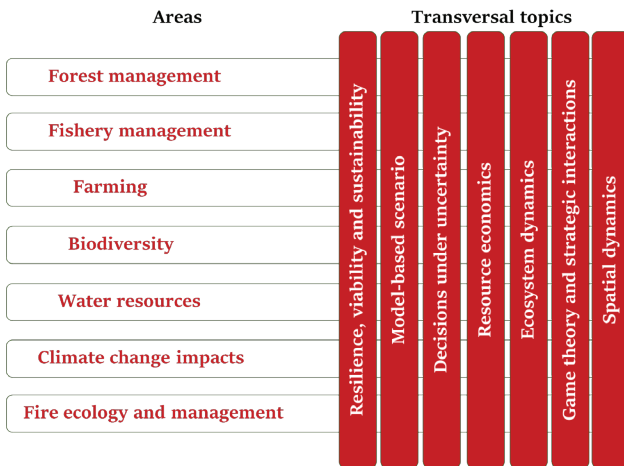
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50 years has caused mosaic loss and an increase of the forest area. An example

Conference topics



Dr. Frank van Langevelde, Terrestrial ecology, The Netherlands



Dr. Linda Nøstbakken, Resource economics, Norway



Mr. Marc Castellnou, Wildfire management, Spain



Dr. Mark Finney, Wildfire modelling, US

The conference will be held at UPC Diagonal Besòs Campus in Barcelona. These brand-new premises right in front of the front sea line and the campus has a potential gross building area of 150,000 m², of which 53,000 m² has currently been built. The campus consists of three buildings dedicated to teaching and research in the following engineering areas: biomedical, electrical, electronics and industrial automation, energy, materials, mechanical,

nanotechnology and chemical.

vulnerability of our ecological and social systems, and the need to provide a better understanding to build more resilient structures that can help the current and future environment. This conference topic will be analysed from different modelling perspectives and dimensions and disciplines during the conference.

Four outstanding plenary talks will be delivered by our invited guest speakers. They will offer their expert perspective on a broad range of applications of natural resource modelling.

The WCNRM2017 will be a pool for exchanging ideas to help inform management ecosystems, natural resources and their exploitation. One of the WCNRM2017 main goals is to foster cooperation among disciplines of ecology, economics, management, mathematics and computer sciences.

Fieldtrip

Mediterranean landscapes are traditionally shaped by forest, agriculture and settlements. However, the rural abandonment during the last

of the Mediterranean landscape, is the Montserrat region, only 60 km north-west from Barcelona. In this mountainous area, the increase of the forest area during decades and the high human pressure due to tourism activities have led to several wildfires that consumed large areas of forest. With the aim to prevent devastating wildfires in this area, there has been many initiatives to manage the landscape and increase its resilience. During the fieldtrip we will visit the Montserrat region to learn and discuss about landscape ecology, conservation management, wildfire management, the current ongoing projects in the area and the modelling solutions.

Conference highlights:

- Three days of oral and poster presentation sessions in parallel sessions.
- Four guest lectures.
- One fieldtrip to Montserrat region.
- More than 100 confirmed oral and poster presentations*.
- Large participation of international delegates.
- Sponsor area.

*the final version of the program is available in the conference website:

www.paucostafoundation.org/nrm2017/



A brief review of IPBES

“Methodological assessment of scenarios and models of biodiversity and ecosystems services”

based on IPBES 2016 report (see reference below)

The latest report of Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) on “Methodological assessment of scenarios and models of biodiversity and ecosystems services” is aiming to provide guidance for experts, scientists and other decisions makers, to spread and reinforce best practices for the use of scenarios and models (S&M) in biodiversity and ecosystems services assessment and policy design. Based on critical analyses of more than 1500 scientific publications, this report:

- explains how to use scenarios and models in multiple contexts and scales,
- assesses key knowledge gaps and suggests means to address them.

In this report the roles of scenarios and models are considered within the IPBES conceptual framework, that depicts the main elements and relationships for the conservation and sustainable use of biodiversity and ecosystem services, human well-being

and sustainable development. This framework enacts a starting point for explaining the role of S&M within the IPBES context.

According to the IPBES view, **scenarios** are “representations of possible futures for one or more components of a system, particularly, in this assessment, for drivers of change in nature and nature’s benefits, including alternative policy or management options”. Three types of scenarios within the policy cycle, can be distinguished:

- “exploratory scenarios”, which represent different plausible futures, often based on potential trajectories of drivers (economics, social or technological factors, climate change, ...).
- “target-seeking scenarios” or “normative scenarios”, which represent an agreed-upon future target and scenarios that provide alternative pathways for reaching this target.
- “policy-screening scenarios” or “ex-ante scenarios”, which represent various policy options.

Figure 1: The IPBES conceptual framework

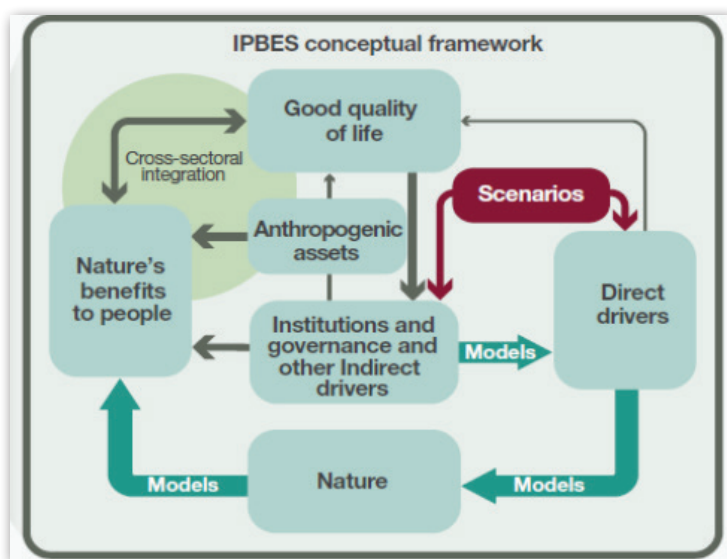
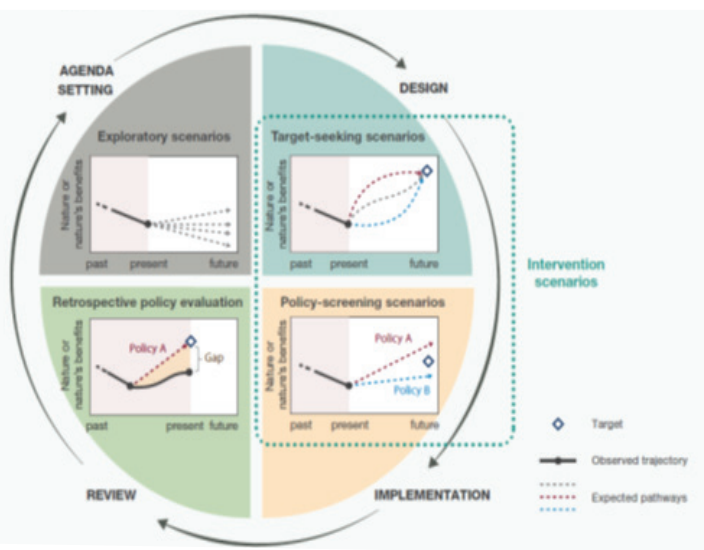


Figure 2: Scenarios and major phases of the policy cycle.



Ref: IPBES (2016): Summary for policymakers of the methodological assessment of scenarios and models of biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services. S. Ferrier, K. N. Ninan, P. Leadley, R. Alkemade, L.A. Acosta, H. R. Akçakaya, L. Brotons, W. Cheung, V. Christensen, K. A. Harhash, J. Kabubo-Mariara, C. Lundquist, M. Obersteiner, H. Pereira, G. Peterson, R. Pichs-Madruga, N. H. Ravindranath, C. Rondinini, B. Wintle (eds.). Secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany. 32 pages.

Models are defined as “qualitative or quantitative descriptions of key components of a system and of relationships between those components”. The relationships between the underlying input and output variables can be modeled using three broad approaches:

- correlative models, in which empirical data are used to estimate values for parameters that do not necessarily have predefined ecological meaning and for which processes are implicit rather than explicit;
- process-based models, in which relationships are described in terms of explicitly stated processes or mechanisms based on established scientific understanding and whose model parameters therefore have clear ecological interpretation defined beforehand;
- expert-based models, in which the experience of experts and stakeholders, including local and indigenous knowledge holders, is used to describe relationships.

This assessment highlights the role of S&M that contribute to policy support, despite the existence of barriers that impeded their widespread use. Actually, scenarios capture diverse policy options that are considered by decision makers and turned by models into consequences for nature, nature’s benefit and quality of life, but practitioners are not fully able to comprehend the benefits and limits of those tools for decision support. The use of S&M may also be hampered by a lack of data and human or technical resources, meager interactions between actors (scientific, stakeholders, institutions) in developing S&M, lack of guidance in the proper models’ choice and poor characterization of uncertainties derived from data, system understanding and predictability. To achieve these barriers, the Platform encourages a broader involvement of practitioners, policy makers and stakeholders and other local knowledge owners through participatory approaches throughout the entire process as a effective mean to fill information gaps.

The report also underlines the difficulty in the S&M choice as this process is extremely context dependent, and its use requires a wide range of spatial and temporal scales, therefore a variety of approaches is needed and the development of integrated assessment models (similar to those employed in climate, energy or agriculture) is encouraged.

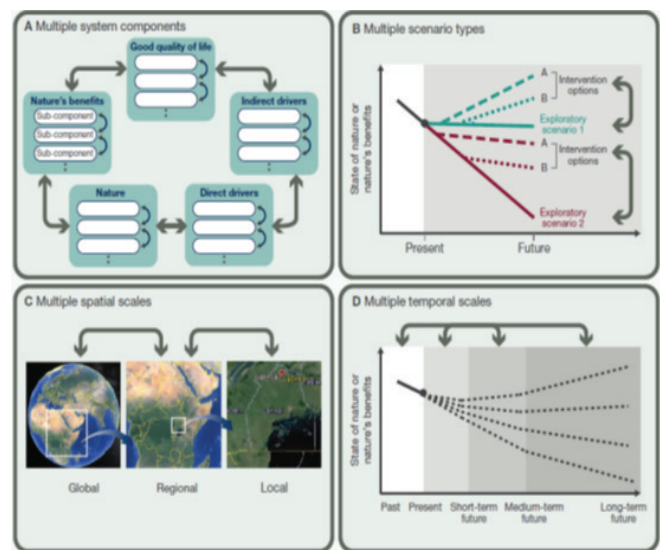
Comprehensive assessments of S&M strengths and limitations as well as sources and levels of uncertainty have to be drawn up and communicated; setting

standards for best practices, using model data and model inter-comparisons could address this issue.

The assessment also reports gaps and lacks of currently available S&M among which one can mention some undetermined links between (direct and indirect) drivers, nature and ecosystems services; poorly evaluated and reported models’ uncertainty, which could lead to serious misconceptions on the use of results in decision making, and a genuine issue with availability of data on biodiversity, ecosystems services and their drivers that may impeded S&M construction and test and capacity building.

Among its recommendations set, the Platform outlines some important characteristics of an ideal suite of scenarios, that would include multiple spatial (local, regional and global) and temporal (short term and long term perspectives) scales, multiple scenario types, participatory and collaborative efforts with other sectors where complementarities exist (for example ties with IPCC on socioeconomic pathways activity for global scenarios).

Fig 3: Linking S&M in four key dimensions (IPBES 2016)



The platform also suggests to combine different types of scenarios across multiple temporal and spatial scales with the integration of models that reinforce the links between drivers, nature ecosystems services and good quality of life and their feedback effects.

To conclude, this assessment, mainly focusing on methods, provides to the scientific community an up to date critical analysis of state of the art and best practices for using scenarios and models that could encourage the biodiversity community to “make a step change in its capacity for foresee plausible future changes as a result of various socioeconomic drivers”.

PRESIDENT'S COLUMN



The 'RMA spring newsletter' is always a special moment for the President of the Resource Modeling Association for several reasons.

Firstly, because the spring period is strongly related to renewal, rejuvenate, recruitment and growth for Nature

which constitute major mechanisms to account for the sustainable management of renewal resources, ecosystems and biodiversity.

Secondly, because spring is the period of our annual international conference which is a pivotal event for RMA and more globally for interdisciplinary researches at the interface of ecology, economics, mathematics and computer sciences.

In that respect, I am very happy to see that the upcoming Barcelona conference WCNRM 2017 is already successful with more than 140 submissions of scientists from all around the world. I am convinced that the central theme of the conference namely "Vulnerability and Resilience of Socio-ecological Systems" as well as the quality and diversity of keynote speakers including Linda Nøstbakken (Norway), Mark Finney (US), Marc Castellnou (Spain) and Frank van Langevelde (Netherlands) have strongly contributed to the attractiveness of the conference. The Rollie Lamberson Medal Award and the prize of best student presentation during the conference will also reinforce the interest of the conference and more generally of the association. In another column of this spring newsletter, Nuria Prat Guitart and her Spanish colleagues from the organizing committee of WCNRM 2017 provides more details and information about the conference.

Among the other good news for RMA, I want to point out that our communication through electronic networking

is progressing well. In particular, the use of Facebook, Research Gate or LinkedIn networks is now more intensive and systematic. In that respect, the young scientists engaged on the board including Vanessa Trijoulet for ResearchGate (<https://www.researchgate.net/project/Resource-Modeling-Association>), Cristina Timolfe for LinkedIn (<https://www.linkedin.com/groups/8578585/profile>), Yi-Hsiu Chen for Facebook (www.facebook.com/Resource-Modeling-Association-543808299018879) all play a major role. Accordingly, their respective dissemination activities are detailed in several other columns of the newsletter.

Another strength of RMA is the bi-annual RMA newsletter. Regarding the content of this newsletter, I think that we need to enhance its scientific content. In that perspective, this spring newsletter contains a note on an important chapter of the IPBES (International Platform for Biodiversity and Ecosystem Services) devoted to "Scenarios and models of biodiversity and ecosystems services." (<http://www.ipbes.net/work-programme/scenarios-and-modelling>). Beyond the contribution of several RMA members to this IPBES chapter, our association and its members are especially well suited to actively contribute to the development of model-based scenarios and IPBES outcomes thanks to its scientific objectives related to management and decision support as well as its interdisciplinary 'DNA'. Another scientific component of this spring newsletter is a summary of the paper 'Evaluating The Impact Of Environmental Policy On The Trend Behavior Of US Emissions Of Nitrogen Oxides And Volatile Organic Compounds' by Nina Sidneva And Eric Zivot which was one the two winners of the Lamberson award in year 2016. This paper published in Natural Resource Modeling exemplifies the interest of econometric and statistical modeling to deal with environmental resources.

This president's column is also an opportunity for me to

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Evaluating the Impact of Environmental Policy on the Trend Behavior of U.S. Emissions of Nitrogen Oxides and Volatile Organic Compounds

by Nina Sidneva^a & Eric Zivot^b

Laureates 2016 of the Lamberson Award



In our paper “Evaluating the Impact of Environmental Policy on the Trend Behavior of U.S. Emissions of Nitrogen Oxides and Volatile Organic Compounds”, we establish the proper statistical methodology to evaluate policy impacts on pollution variables of interest when data is limited to a single time series that can be either difference-stationary (DS) or trend-stationary (TS). We provide an application of this methodology to evaluate the effect of environmental regulations such as the Clean Air Act Amendments (CAAA) of 1970 on the U.S. air pollution emissions trends of Nitrogen Oxides (NOX) and Volatile Organic Compounds (VOC).

We model the time series behavior of emissions as:

$$y_t = d_t + u_t$$

where d_t represents the deterministic trend (with possible multiple trend breaks at fixed and possibly unknown points in time) in emissions and u_t represents the stochastic deviation

from the deterministic trend. The deterministic trend d_t is the main driver of the level of emissions. We assume d_t can be affected by infrequent large shocks, such as major technological changes or environmental policy changes, that can permanently change its level and direction. We model these infrequent shocks as exogenous trend breaks. The stochastic deviation from

^a Financial Planning Unit, Seattle City Light, Seattle WA, USA. (Nina.Sidneva@seattle.gov)

^b Department of Economics, University of Washington, Seattle WA, USA. (ezivot@uw.edu)

trend u_t represents smaller and more frequent shocks that push emissions away from d_t . The stochastic behavior of u_t can be covariance stationary, or $I(0)$, implying that current deviations from trend are transitory or unit-root non-stationary, or $I(1)$, implying that current deviations from trend are the accumulation of all past deviations from trend. In the former case, the detrended series $y_t - d_t = u_t$, is $I(0)$ and y_t is called TS process. In the latter case, the first differenced series $\Delta y_t - \Delta d_t = \Delta u_t$, is $I(0)$ and y_t is called DS process.

For many time series, it is an open debate as to whether the TS or DS representation is most appropriate when there may be trend breaks in the data. The TS versus DS debate in the presence of breaks has been investigated for pollution data by Strazicich and List (2003), Lanne and Liski (2004), Lee and List (2004), Fomby and Lin (2006), and Bulte et al. (2007). We follow the application of Lee and List to illustrate the current state of the art for investigating trend breaks and testing TS versus DS in pollution data. In our statistical analysis of emissions, we concentrate on answering two questions. First, were there breaks in the deterministic trends, d_t , of NOX and VOC emissions and, if they occurred, did they happen around the same time the CAAA were passed? And second, accounting for possible breaks are the U.S. emissions of NOX and VOC TS or DS processes?

Our first question is directly related to the effectiveness of the CAAA, as the CAAA were implemented to permanently reduce certain pollution emissions. Our second question is important for assessing the potential long-term impact of environmental policy which relies on forecasting future emissions and evaluating the accuracy of these forecasts. For both DS and TS processes, long term forecasts are

the extrapolated deterministic trend. However, forecast uncertainty for a DS process increases with the forecast horizon whereas it is bounded for a TS process. As a result, the long-term effects of a policy that changes the trend is much more certain when the data are TS than when they are DS.

Methodology for Determining Trend Breaks in TS and DS Time Series

As discussed in Perron (1989) and Perron and Yabu (2009), testing for breaks in trend, whether the break dates are known or unknown, is complicated when one has no specific prior knowledge about whether the data is DS or TS because the distributions of traditional tests (e.g., Chow tests) for structural change are different for DS and TS processes. One cannot easily remedy the problem by pretesting the data to see if it is DS or TS using unit root tests because the appropriate unit root tests should take into consideration the possibility that there are breaks in trend. What is required to avoid this circular inference problem are tests for shifts in trend that allow the dates of structural change to be known or unknown and which have the same distribution for both DS and TS processes. The trend-shift tests of Perron and Yabu (2009) and Kejriwal and Perron (2010) satisfy this requirement. The trend shift tests in Perron and Yabu (2009) are for the case of a single break at a known or unknown date, and for multiple breaks at known dates. Kejriwal and Perron (2010) show how the Perron and Yabu single break tests for an unknown date can be used in a sequential procedure to allow for multiple breaks at unknown dates. Our paper describes these tests in detail.

Based on the Kejriwal and Perron

(2010) multiple break tests we find two breaks in VOC emissions at 1969 and 1983, respectively. The first break corresponds to the CAAA of 1970, and the second break in 1983 can be related to several increased standards for VOC emissions from the surface coating operations passed in the early 1980's as a part of Standards of Performance for New Stationary Sources, part 60, subparts EE, MM, RR, SS, TT, WW. We find five breaks in NOx emissions at 1947, 1957, 1969, 1978 and 1987, respectively, using total emissions and four breaks at 1947, 1960, 1969 and 1979, respectively, in per capita emissions. The first break found for all series is 1969, which suggests that the CAAA had the largest impact on the trend behavior of emissions. The reasons for the other breaks are less clear and could be due to technological progress and the phasing in of the CAAA amendments.

Figure 9 from our paper illustrates the pollution series with estimated trend breaks. The rate of growth in the NOx emissions slowed down considerably after 1970. However, the main change in the trend occurred after 1978 when the trend reversed sign and NOx emissions started to decline. The trend in VOC emissions, in contrast, was sharply reversed in 1970 and the rate at which VOC emissions were declining increased slightly after 1983.

Methodology for Determining TS vs. DS in Time Series subject to Trend Breaks

Unit root tests test the null hypothesis that a time series is DS against the alternative that it is TS. If the time series in question has trend breaks, then the appropriate unit root test should account for trend breaks, either at known or estimated dates, and the breaks should be allowed under both the DS null hypothesis and the TS alternative.

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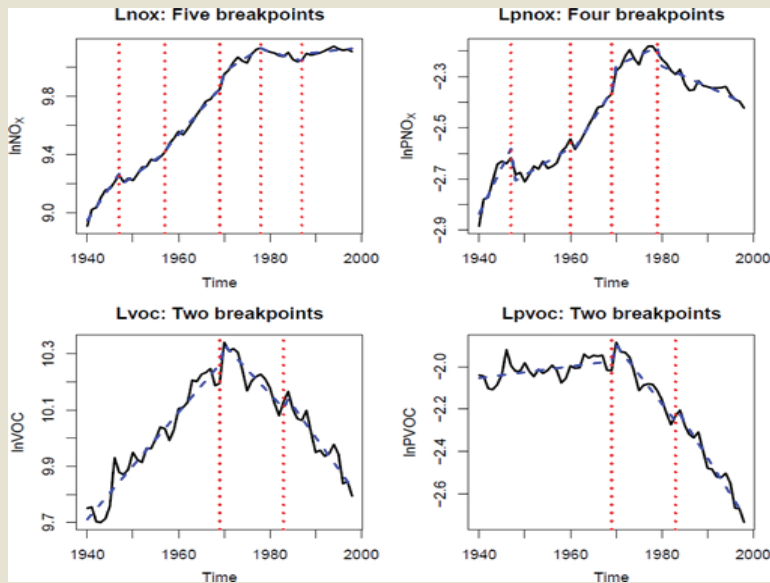


Figure 9: Pollution emissions with estimated break dates and fitted trends

Such a unit root test has been recently developed by Carrion et al. (2009). In particular, the Carrion et al. (2009) unit root test is an extension of the point optimal unit root test of Elliot et al. (1996) to allow for multiple breaks. Our paper describes this test in detail.

We use the Carrion et al. (2009) unit root test to determine if the NOX and VOC series are TS or DS (with breaks). Following Kerjiwal and Lopez (2013), we only report the unit root tests with up to two breaks because of the small sample size. We do not reject the null hypothesis

at the 1% significance level that \ln_{NOx} and \ln_{pNOx} are DS series with at least two breaks in the level and drift of their trend functions. This finding implies that both environmental policy associated with the CAAAs in 1970 and all other non-policy shocks have had permanent effects on the NOX emissions. As a result, the long-term trend in NOX emissions will be constantly changing to reflect these shocks. In contrast, we can reject a unit root in the \ln_{VOC} and \ln_{pVOC} series at the 10% significance level with one estimated break but we do not reject a unit

root at the 1% level when we allow for two estimated breaks. With one break, rejection of the null for these series indicates that the CAAA of 1970 represented the only permanent shock and all other shocks had only temporary effects. Allowing for two breaks reverses the results and highlights the importance of accounting for multiple breaks when testing for unit roots.

Conclusion

We have applied current state-of-the-art time-series econometric techniques to analyze long-term trends of NOX and VOC emissions and to determine how past environmental regulations have affected them. We find compelling evidence that environmental regulation in 1970 has permanently changed VOC emissions from increasing to decreasing, and mixed evidence that deviations from trend are trend reverting. Given the negative drift in trend after 1970, we should expect VOC emissions to continue to decline steadily over time. We also find that the upward drift in NOX emissions has been permanently reduced due to CAAA of 1970 but that its overall trend continues to change randomly and there is considerable uncertainty about the direction of its future behavior.

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Research Gate



LinkedIn

The Resource Modeling Association is now available as a project on ResearchGate (RG). RG is a social networking site for scientists and researchers to share papers, ask and answer questions, and find collaborators.

The RMA project can be followed at this address : <https://www.researchgate.net/project/Resource-Modeling-Association>. It enables the RG community to keep up to date with all the information related to the RMA. The details of the upcoming conferences are posted regularly with all the specific links and reminders. The newsletters and the issues of the Natural Resource Modeling (NRM) Journal are also instantaneously shared. The scientific papers of the NRM journal, when available on RG, are referenced within the project for easy access. Each update can be commented by anyone which allows followers to ask questions related to the association or the specific post.

The RMA project has been created on RG late October 2016. As I write, we have published 19 updates. We count many followers from all over the world. I would greatly advise all RMA members, but also non-member who would be interested in learning more about the association, to follow the RMA project on RG. You will receive a notification for any new update shared on the RMA project and this will stop you from missing important information about the RMA.

This project is managed by Vanessa Trijoulet
(vanessa.trijoulet@noaa.gov)



The Resource Modeling Association LinkedIn Group is aiming to connect scientists working at the intersection of mathematical modeling, environmental science, and natural resource management and create an opportunity for them to come together and exchange knowledge, ideas, methodologies, assessment techniques or professional judgement.

LinkedIn is a business- and employment-oriented social networking service that operates via websites and mobile apps. Founded on December 28, 2002, and launched on May 5, 2003, it is mainly used for professional networking, including employers posting jobs and job seekers posting their CVs.

The RMA group bring together members with various expertise from many disciplines including ecology, economics, modeling and from many institutes and universities from all over the world. The members are invited to bring topics and articles based on their research or the group interests in order to provide each other support and stay informed.

That being said, we look forward to seeing you becoming a member of our LinkedIn Group.

This group is managed by Christina Maria Timofte



(continued from page 5)

say to Bob Fray how grateful we are for the whole work done during these last years for both the association RMA and RMA newsletters. As Bob plans to retire soon from his position of Professor of Mathematics at Furman University, we agreed with him to transfer the edition and publication of next RMA newsletters to a GREThA team in Bordeaux including Anne-Sophie Masure (specialist of the international communication at the University of Bordeaux), Sébastien Lavaud (who was strongly engaged in the organization of WCNRM 2015 Bordeaux), and myself. The current 'Spring 2017' newsletter has been built in strong collaboration with Bob. Despite his retirement, we hope that Bob will remain engaged in the association and continue to actively participate.

To end up, this president's column is also an opportunity for me to send a warm welcome to all new RMA members, in particular those that have recently joined us for the upcoming conference in Barcelona.

— Luc Doyen

Announcement:

#WCNRM 2018
in Guangzhou, China

#WCNRM2017 Fieldtrip in Montserrat

The fieldtrip will bring you to the Montserrat region, 60 km north-west from Barcelona to learn and discuss about landscape ecology, conservation management, wildfire management, the current ongoing projects in the area and the modelling solutions.



The Montserrat area is mostly forest and has suffered from major fires in recent decades mainly resulting from fuel load accumulation, crops disappearance and decline of traditional forestry practice.

Over the last 40 years, nearly 60% of the forest area has been burned at least once.



Integrated silvopastoral management plan is implemented including grazing management and forest restoration plans, to increase the resilience of forests against fires and contribute to biodiversity conservation.

more information: <http://lifemontserrat.eu>

Editor's Column

by Shandelle M. Henson

Editor-in-Chief of Natural Resource Modeling



As a member since 2004 of the editorial board of Natural Resource Modeling, I am excited that Dr Catherine Roberts, our former Editor-in-Chief, is now the Executive Director of the American Mathematical Society. During Catherine's tenure

as Editor-in-Chief, the Journal made significant advances, including the move to publishers Blackwell and Wiley. As I begin my role as Editor-in-Chief, I enthusiastically thank Catherine for her long-time leadership and the mentoring she has provided me during this transition. I also thank our Editorial Assistant, Donna Roberts, for her continued support and expertise. I have several important news items regarding the Journal.

1. The old paper issues (1986-1998) of the Journal are being archived by Wiley. When that is completed, all issues will be available online.
2. The editorial board is reaffirming its commitment to the timely processing of papers. The Journal also will continue Catherine's commitment to obtain timely, substantive, and constructive review feedback for early-career scientists.
3. In January 2018 we will publish a special issue of review papers in honor of Catherine. Wiley makes the January issue freely available for one year, and review papers tend to get a lot of attention. Please let me know if you'd like to submit a review paper for this special issue.

4. Please welcome five new editors:

Kevin L.S. Drury (Mathematical Biology)
Huntington University, USA

Eric Alan Eager (Conservation Biology)
University of Wisconsin – LaCrosse, USA

Yun Kang (Complex Adaptive Systems)
Arizona State University, USA

Marko Lindroos (Game Theory and Fisheries)
University of Helsinki, Finland

Sanyi Tang (Mathematical Biology & Bio-economic Modeling)
Shaanxi Normal University, PR China

5. The Journal will begin requiring papers to include a 'Recommendations for Resource Managers' directly below the Abstract. This section will be accessible to laypersons and will state clearly, in 150 words or less and in three to five bullet points, the primary implications for resource management. We hope this new requirement will encourage submissions that take seriously the mission of the journal.

6. We have several exciting new categories for submissions:

- Research Article—Peer-reviewed original research paper focusing on the mathematical modeling of natural resources. Includes a technical abstract as well as a 3-5 bullet Recommendations for Resource Managers in non-technical terminology.

Editor's Column

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- **Application Article**—Peer-reviewed original research paper that applies a mathematical technique to a real system, thereby generating new mathematical and management insights. Includes a technical abstract as well as a 3-5 bullet Recommendations for Resource Managers in non-technical terminology.
- **Short Communication**—Peer-reviewed short original research article or technique paper without subheadings. Includes a technical abstract as well as a 3-5 bullet Recommendations for Resource Managers in non-technical terminology.
- **Review Article**—Peer-reviewed, brings together and synthesizes the literature on one topic or methodology, not focused on the author's own work.
- **Synthesis Article**—Peer-reviewed, synthesizes the author's or group's thematic work or methodology over a period of time in the context of the field.
- **Perspective**—Opinion article, peer-reviewed by referees who then may be invited by the editor to write Responses. May deal with opposing views and debates.
- **Editorial**—Written by a member of the editorial board or a guest editor to introduce thematic issues, special issues, and items of interest. Not peer-reviewed.
- **Letter**—Solicited or unsolicited by editor. Usually not peer-reviewed. Comments on a paper or letter in this or another journal.

Please remember to submit manuscripts, plan special issues, and advertise for the Journal within your network and at conferences !

Best wishes,

Shandelle

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Editors : Anne-Sophie Masure
Sébastien Lavaud , Luc Doyen

GREThA
Université de Bordeaux
avenue Léon Duguit 33600 Pessac
FRANCE