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(mostly) environmental economics

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## #MeetTopEnvEcon – Anastasios Xepapadeas

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# Anastasios Xepapadeas

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I am very happy to present **Anastasios Xepapadeas** in my new episode of *Meet Top Environmental Economists* (#MeetTopEnvEcon). Tasos, as everyone calls him, is currently Professor of Economics at the Department of International and European Economic Studies of Athens University of Economics and Business and the Department of Economics of the University of Bologna (part time with parallel affiliation). He is an International Member of the US National Academy of Sciences and is a past president of the European Association of Environmental and Resource Economics and past Chair of the Board of Directors of the Beijer Institute of Ecological Economics of the Royal Swedish Academy of Sciences.

Tasos has published on a large variety of topics such as Spatial-temporal Analysis in Economics, Economics of Climate Change, Uncertainty, Ambiguity and Robust Control, Environment and Growth as well as Evolutionary Approaches to Policy Design and Environmental Policy. He participated as coordinator or lead researcher in more than 35

research programs funded by the EU, the Greek government, or private sources in the area of environmental and resource economics. He has published more than one hundred and fifty papers in leading journals and collective volumes, such as the American Economic Review, European Economic Review, Environmental and Resource Economics, Journal of the Association of Environmental and Resource Economists; or the Journal of Environmental Economics and Management.

It is always a great pleasure to talk to Tasos. He is open for most discussions, and really enjoys working with the younger generation of researchers. Don't hesitate to get in touch with him if you think you have a nice idea, there is much to learn from him. I had been inspired by his work on shallow lakes, which I find gives a neat and novel way to think about irreversibilities. It's always interesting how one simple equation can capture so many ideas.

Here is the **video of the Express Views interview**:

Express Views interview with **Anastasios Xepapadeas**

Here is the **podcast version of the Express Views interview**:



0:00 / 23:34



Podcast: Express Views interview with **Anastasios Xepapadeas**

And now I am very happy to present you the **Meet Top Environmental Economists interview**:

(Date of interview: December 2021)

(download interview as pdf)

**Meet Top Environmental Economists interview – Anastasios Xepapadeas**

*Could you please let me know what motivates you to do research in environmental economics.*

My PhD at the economics Department of the University of Manchester was not in environmental economics, but on straight-forward cost-benefit analysis. After my PhD, I returned to Greece, where I spent two years in the army, which was a requirement for all Greek citizens. When I went back on the job market, I started working for the Public Power Corporation, which was a public enterprise controlled by the Ministry of Energy. My tasks were basically to help design pricing policies, although these days pricing policies were very much affected by the political aspect of the problem. So, the minister would, at the end of the day, approve the new prices and the approval would include 'we need to subsidize that group', 'we need to do this, we need to do that'. My other task was to help engineers to try and design the expansion of the energy system in an efficient way, and that was very interesting, and I enjoyed it.

It was nothing related to the core of environmental economics, but mainly to energy and the expansion of power systems. But then I decided to go into academia, because there were openings, there were new departments coming out, so I thought 'ok' my objective was academia. These days, we're talking about the mid-80s now, were an interesting period of changes in Greece, because 1981 was a year of big political change in Greece. It was the year that Andreas Papandreou took over, who earlier in his career had been the head of the Department of Economics at UC Berkeley, and was a very good economist with broad ideas. The Greek university system those days followed the German system, which was a pyramid of people under the professor who held a chair. Papandreou changed the Greek university system and made departments.

This was the point where I entered the system, and I started looking for different things regarding how I would start my research again. There were water management projects discussed these days, so I started with these, using my knowledge of cost-benefit analysis applied to environmental issues, and that's how I ended up doing research in environmental economics.

During my PhD studies I had wanted to do research in optimal control and dynamic optimizations, and thus I had followed some classes on mathematical economics. When I started doing research after my service in the army, I liked the idea of modelling, and optimal control was very useful. I believed that to understand a problem, somehow you need to take the core of the problem, model it, and then try to find out the mechanisms that drive the whole problem. And to do that, you need to model, I mean you need to take out everything that isn't the core, so, that's what I did, and I guess I was successful with that.

*Yes, one can certainly say that. Your research is heavily mathematically based and when one looks at the evolution of research, there's a change during the past years, with a large move from theory to much more empirical papers being published. So, as a mathematical economist, how do you feel about this?*

Actually, in my PhD I did econometrics. Those days, I was trying to do both, so I did econometrics when I started research, but then I moved to theory because I liked it more. I believe that in order to have good empirical results, you need good theory. So, I think that the empirical analysis somehow should go together with the advances of theory. And the recent focus on empirical analysis, maybe somehow delays the breakthroughs in theory, because a lot of good minds, lots of young scientists, brilliant scientists, go to econometrics.

This may be fine, because they might think that they will have more recognition there, but we need a balance in the development of research. I would prefer a little bit more theory in journals and research agendas.

*Would this also be an advice that you would give to young students that want to work in your field or what would you suggest to them?*

What I would suggest to them is to be good in basic economics, to study economics as a core and acquire the mathematical tools which you need if you want to be a good econometrician. If you get publications faster and greater visibility by doing econometrics, then people, especially younger people in academia that want to go forward, will follow you in that approach and that may create a bias. It's hard to advise people in these kinds of things because I might tell them 'go and study here', but if you do theory and cannot be successful in developing theories, or as successful as you can be in econometrics, then there's an issue there. I want more balanced approaches to these research strands. So, my advice would be, if you want to get into environmental economics, you need to be a good economist, and for that you need to know your tools.

But, of course, environmental economics is interdisciplinary, which means that it also attracts people from different disciplines. Then, I believe that researchers in environmental economics should have a good understanding of economics, have the mathematical tools to build economic-environmental models, and to understand issues related to the hard science part of environmental economics.

*And let's say, there are some students who would like to change the world, who would like to make a big impact, how do you think would they be able to do that as a potential future professor in environmental economics. Or would you suggest them to take potentially another route?*

To make a big impact, most likely you have to be a politician, because that's how you make a big impact in the world. Now, to be a scientist and make a big impact I think that, unless you are Einstein or Turing or somebody of that level, scientists make marginal changes. For the majority of scientists, my feeling is that some of the changes and the contributions are 'big marginal', if I can use that term, some of them are 'marginal-marginal'. Maybe you can have strong scientists that might develop a breakthrough, but in economics, I'm not that sure. For example, Kenneth Arrow was the greatest economist of the 20<sup>th</sup> century. He put forward a lot of ideas which have been used and built on, but I think that for most scientists or economists the changes will be marginal.

*What is your favorite article in environmental economics?*

I have lots of them. It will be very hard to distinguish my favorite article. I would say, I enjoyed, but also it helped me in what I did later, the paper by Dockner and Van Long, on international pollution control in JEEM. It was as a very interesting thing, feedback equilibria, non-linearities and all that. Also, Kathy Segerson's paper on non-point source pollution, a long time ago, it also gave me ideas and helped me understand better certain things that I then used and published – that was in JEEM.

But after I started working on these spatial-temporal dynamics, what I really enjoyed was Allan Turing's paper on the chemical basis of morphogenesis. It's a paper that has nothing to do with economics, and it's written in a style that we are not used to now, I think the

paper was published in the early 50s. But if somebody is interested in these kinds of analytical approaches, it's a real beauty. He proved that if you mix two chemicals, say blue and yellow, you don't get something in between, if you mix red and blue you get purple, but if you mix them in a specific way, you get blobs, you get patterns. So, this is how you get morphogenesis, and then biologists discovered using Turing's mechanism, they modelled the way that leopards or animals get their spots on their skin. So, it's a beauty, I really like it.

*What book should every environmental economist have read?*

I think Baumol and Oates on the Theory of Environmental Policy, and Dasgupta and Heal on Resources.

*In the last 20 years, the number of researchers in our discipline has substantially increased, do you think that this is good for the profession or are there simply so many papers being written nowadays, that we just don't have the overview anymore and that even more important papers get simply lost in the system or behind many smaller marginal contributions of so many other papers.*

I think so. I see that there's a big supply of papers coming now from countries that are developing. As an editor of different journals, I now experience a big supply of papers from countries not in Europe, the US or Canada. And then there's also a big development of these "predatory journals". You receive probably hundreds of invitations per month to edit special issues or to submit papers in these journals, but these journals are no good, people pay to be published in these journals. So, this oversupply of papers everywhere somehow dilutes the very good papers, so you need to concentrate on specific top journals to see good papers. In good journals, however, the editors will be conservative most of the times. In economics it takes one to two years to publish a paper in a journal with a reputation. In other disciplines, like in physics, you publish very fast, ideas get tested and rejected really fast. In economics, we are slower; sometimes a good paper might get lost.

*So what future direction would you envision for your field and what do you see as the obstacles?*

We need a breakthrough in environmental economics.

*Why? What's wrong with environmental economics?*

There's nothing wrong with environmental economics per se. Every field needs to go forward, you need to go forward, to have new ideas, new approaches to problems. I think we need that, and this has to do with theory, because I think that it is more likely to get a breakthrough from theory than from econometrics. We need to free ourselves from that trap of analytical solutions and move a little more towards the numerical methods. I think it's happening little by little. There's a group of people, especially in climate modelling, that move to numerical approaches and try to solve big numerical problems. Maybe we have to move towards this direction, but again, what might create a problem for us could be theory. For example, you know very well, that one of the greatest issues in climate models is the lack of rigorous theory behind the damage function. That's where I see the need for the field to expand.

*And what do you see as the obstacle towards achieving these breakthroughs?*

There are a lot of good universities and research institutions around, so I don't think there's

any kind of institutional obstacle. An obstacle related to the possible breakthroughs could be the urge to build your career and you try to publish a lot, doing lots of regressions, doing lots of econometrics, in issues that might not support the breakthrough I have in mind, because you believe by doing that, your visibility might be improved. But by doing that, you lose the opportunity to bring forth a breakthrough. Don't get me wrong: I do not underestimate at all the value of the empirical work. I just think that it may not be the vehicle for a breakthrough in environmental economics. I think a breakthrough will have to come from basic research – policy basically uses the results developed in basic research.

*And do you think it should be someone with a background of really pure theory of economics or do you expect it to be a more interdisciplinary point of view?*

I don't know to be honest. Let's say the breakthrough might come from a person with an interdisciplinary background who manages to combine certain things and see through these combinations what comes forward. But interdisciplinary work is difficult because it's not enough to read a few things from that discipline and the other. You need to go deep, to the core. And this is a big investment, in time, in effort, and as such, not an investment that everybody is willing to undertake, because by focusing on one thing instead of spreading around, you might be more successful in your career in academia. At the end of the day, you might not manage to be really successful in an interdisciplinary context

*What you just said is something that I also had on my mind. Most professors spend a lot of their life on one specific topic, but you work on shallow lakes, on extensions to dynamic games, spatial economics, uncertainty, pollution, climate change, environmental policy. How would you describe your research agenda?*

As a person doing scientific research, I don't like repetition, so I try to get involved in new things, new ideas and likely I have colleagues and friends that I discuss these ideas with at some point. And I have to thank Karl-Göran Mäler for creating these institutions that develop these ideas. The work on temporal dynamics and shallow lakes came from the Beijer Institute. There was a collaboration with the Abdus Salam International Centre for Theoretical Physics in Trieste and then we were trying to find new ideas. It was there that I started to work with Buz Brock in spatiotemporal dynamics. In Beijer there were people like Simon Levin, who is a famous mathematical biologist, and mathematical biologists are very much used to these diffusion processes and analytical mathematical work in space. This is where I learned about Turing instability. The contact I had with people from different disciplines shaped my research agenda.

*Would you say you're more interested in the mathematical challenges involved or in the topic per se?*

In the topic per se. I teach my students in economics that mathematics is a tool. You need good mathematics, you need to be able to use that tool very well, because that tool sometimes, if you don't use it very well, might create problems. But I'm interested in the outcome of mathematics, and if it makes sense. I'm not trying to find a theorem by reading mathematics that I try to fit in economics. At least my objective is to go the other way around: to have an economic problem and then try to find a theorem that might be used to solve the economic problem, or whatever problem I have in mind. So, sometimes, I see mathematics and economics as plumbers use their tools. Plumbers have these great tools that they use to fix our pipes, and that's what I think of mathematics in our discipline: as an elegant tool, but always a tool.

*Don't you feel that rigid mathematical modelling is also holding us back sometimes? It leads us, for example in the case of dynamic games, to only consider a linear quadratic setup, which then gives very specific results that may not be generalizable.*

I agree with you, but maybe we don't need analytical solutions. In physics they don't use analytical solutions. We specify the range of the functional forms and parameters that make sense in economics and then try to get numeric solutions in that range. If that range of parameters makes sense in economics, then the solution will make sense. That's how I see it. In dynamic games, we had some papers, especially with feedback solutions, that could not be solved analytically, and we solved them numerically and the results made sense. I think that we don't need that generality, we need generality that makes sense in terms of economics.

Let me give you an example: in the late 90s, Matthews, a scientist, developed the idea that instead of using a nonlinear formula for temperature forcing when trying to understand the dynamics of temperature, a simple linear relation can be used. And that simplifies things a lot. Then there were a lot of reactions, I remember having big fights with the reviewers in some papers where we used that assumption. A reviewer suggested to the journal not to publish that paper, because it would ruin the reputation of the journal among environmental economists. We managed to convince the reviewer that it was a valuable approximation, and a couple of years later, some important research results stated that this linear relationship is relevant for the practical range of global greenhouse gas emissions. So, we might think that, instead of waiting for the general formula, maybe we can get numerical solutions for problems where the parameters make sense in terms of economics.

*In addition to your analytical and academic work, you work on many publicly and privately funded projects. How do you reconcile the very applied work that one needs to do for these projects with your much more heavily focused theoretical research?*

I am often in charge of projects that are financed for basic research, so there is no conflict. But in other projects I worked on, the idea was to say something that makes sense in terms of policy. For example, almost 11 years ago, we started a project for the Bank of Greece to study the impact of climate change in Greece. The Bank of Greece was among probably the first central banks to start studying this problem. I don't know if it contributed so that more central banks started trying to study this problem, but at the same time, it made the problem, or the issue, of climate change much more visible in Greece, simply because it was the Bank of Greece talking about that. And we see now that the government of Greece is very much pushing forward the process of decarbonization. A couple of days ago there was a discussion in which the prime minister of Greece, Frans Timmermans, the director of the IMF, and Jeffrey Sachs, discussed these issues. I think that some of these discussions that came out of the Bank of Greece helped shape the opinion in Greece towards this direction.

*What were the main lessons that you took away from these privately or publicly funded projects?*

The main lesson is that sometimes you might make decision makers aware of the problem. Sometimes you might not. I had a very small project with a gene bank in Thessaloniki that keeps seeds. It was a very small project, but then it somehow helped that gene bank to get new refrigerators, and I was very pleased with that.

*Do you nowadays get offers for research projects of this kind or do you still have to apply just like*

*everybody else?*

Sometimes I get asked, sometimes, if it is something big, I have to apply. After all these years, I don't want to get involved in bureaucratic issues like writing proposals. So, usually I don't apply. If there are younger people that want to undertake the effort of administrative work, I might help. But these days, I don't take the initiative.

*You still have PhD students. How do you feel about them, what is your main incentive of having PhD students?*

Well, I like the topics. They come with an idea, because usually when I had PhD students or people would come to me and asked me if I would supervise, I ask them their idea; I don't give my PhD students topics. I want them to have their own idea and if I like their idea, I go forward with that. I want to understand what they're doing.

*Let's go to a slightly different topic. Do you know the concept of holidays or do you take your articles with you to the beach?*

Well, I know the concept, it's how to implement it that I don't know (laughs). Yes, I go swimming, I'm a sea person, I love the sea, usually I take my snorkel with me, spend several hours snorkeling and then I go home. When I'm in areas where snorkeling isn't so interesting, I go and use chairs on the beach, I usually take some work with me. I've reviewed papers, I've corrected papers and I've gone through proofs on the beach. Usually, in this profession, you can't simply 'turn it off' — or at least I cannot do that. It's always there. So yes, I know the concept but I'm not very good at implementing the idea.

*What is your favourite economics joke or anecdote from a conference?*

It's an anecdote, it's about a mathematical economist. A mathematical economist goes on a hike and there's a shepherd with a lot of goats and sheep. So, they start talking and the shepherd says 'ok, I produce milk here, I produce the wool and meat I need, but what are you doing here?' And the other guy replies 'I'm a mathematical economist'. 'What's that, can you give me an idea?' — he says 'look, I'm using mathematics to solve problems in economics.' The shepherd looks and says, 'What is this?', and he replies 'ok I'll give you an explanation: I can tell you exactly how many animals you have and what kind of animals you have here.' The shepherd says: 'ok, if you manage to give me a correct answer, I'll give you a goat to take home'; 'ok, fine'. The mathematical economist takes out the computer and starts doing one of these spatial-temporal models, densities etc. Finally, he says 'you have 136 animals, you have that many goats and that many sheep.' The shepherd says: 'you are right, take a goat and go'. So, the mathematical economist takes a goat and starts leaving, then he hears the shepherd 'Where are you going with my dog?'. This shows how far from reality we can sometimes be.

*Can you suggest someone who you would like to see these series of interviews?*

It would be interesting to talk to Simon Levin, who is a great mathematical biologist. He has been involved with lots of economists, with Kenneth Arrow, with people in Princeton, he understands economists and he understands a lot about the issues that we are dealing with. Also, David Zilberman in Berkeley, he did a lot of work in everything from agricultural economics, environmental economics, to econometrics, and of course Buz Brock, who I

believe is one of the greatest mathematical economists with great understanding of environmental and ecological issues.

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