



Researching Social Theories, Resources,  
and Environment International Summer School

## Report to sponsors of Second ReSToRE Summer School 4 -8 July 2022



Speakers and delegates of Second Summer School  
during fieldtrip to Howth, Co. Dublin

### Organising sponsors:



### Under the patronage of:



Report date: 17th August 2022

## **A few words from the participants**

**DAVID CAVELL, TAYLOR  
WOODROW, UK**

**"I AM REALLY BUZZING FROM THIS WEEK! THERE HAVE BEEN SO MANY AMAZING SPEAKERS AND EXCELLENT TALKS, AND NEW PERSPECTIVES. RESTORE AND THE WORK ICRAG IS FACILITATING HERE IS GETTING TO THE HEART OF THESE ISSUES."**



**BETHEL UKAZU, ENVIRONMENTAL  
ENGINEERING STUDENT AT THE  
TECHNICAL UNIVERSITY  
DARMSTADT, GERMANY,  
ORIGINALLY FROM NIGERIA**



**"I LIKE THAT THERE ARE PEOPLE FROM ALL WALKS OF LIFE. I LIKE THAT PEOPLE FROM INDUSTRY ARE AT THE SUMMER SCHOOL. I AM FASCINATED BY THEIR CONTRIBUTIONS. IT GAVE ME A FEELING OF WORKING ON SOMETHING REAL AND TANGIBLE. IT'S PRACTICAL. I'M SATISFIED. I FEEL LIKE I CONTRIBUTED TO SOMETHING."**

**PROF WOUTER POORTINGA,  
FROM CARDIFF UNIVERSITY, UK,  
EXPERT MENTOR**

**THIS SUMMER SCHOOL IS ONE OF THE TRULY INTERDISCIPLINARY SUMMER SCHOOLS THAT I'VE BEEN TO WHERE PEOPLE HAVE SO MANY DIFFERENT BACKGROUNDS**



## ReSToRE 2 Sponsors and organisers

The International Union of Geological Sciences (IUGS) and iCRAG, the Science Foundation Ireland Research Centre in Applied Geosciences were ReSToRE's organising sponsors.

The Summer School was run under the patronage of UNESCO.

ReSToRE received:

- Gold-level sponsorship from Teck Resources, Rio Tinto, First Quantum Resources, Boliden, and Freeport-McMoRan
- Silver-level sponsorship from Glencore
- Sponsorship for participants from developing countries from UNESCO's International Geoscience Programme.

### ReSToRE 2 sponsors



*Logos of ReSToRE 2 sponsoring organisations*

## Foreword from ReSToRE Director, Dr Geertje Schuitema

On behalf of ReSToRE 2 (Researching Social Theories, Resources, and Environment) International Summer School organisers and participants, I would like to thank all sponsors for your generous support, which allowed an international and interdisciplinary group of early career participants to meet and discuss vital issues around sustainably resourcing present and future generations.

Like its predecessor, ReSToRE 2 Summer School aimed to nurture an interdisciplinary and experiential learning environment for geoscientists and social scientists to address cross-cutting topics and to create a network for all participants and contributors. Through a mix of lectures and participant-led workshops, as well as a vibrant social programme, 50 participants from 19 developing and 10 developed countries and a huge variety of disciplines came together to learn from each other and debate these pressing issues. Ten distinguished mentors facilitated the workshops, while taking part in the discussions, and contributing to the topics and debates by sharing knowledge and experience.

Topics addressed included: identifying the key trends that drive the demand and supply for metals and minerals in the modern world; how circular economy principles can inform metal extraction; and how behavioural change can make an important contribution to resource conservation and climate mitigation. This report provides a summary of the week, including outputs, workshops, participant highlights, and future plans.

I really enjoyed witnessing all the interactions, the questions, and participants' willingness to think about different disciplines and approaches. The high quality of the discussions taking place in the workshops was reflected in participants' presentations on the final day.

These participants' words give a flavour of the event:

**Leeysmo Hulijeli, PhD student at Akita University, Japan, from Papua New Guinea**

*The atmosphere has been so free and so conducive for dialogue and sharing of ideas. I've really warmed up to everyone and developed a lot of friendships and networks, so I look forward to the opportunities that will come from this.*

**Constanza Araya Ibarra, student at University of Chile, Chile**

*Having people with different backgrounds, styles of work, histories, and interests has been a challenge but, most of all, an inspiration. I've been inspired by people's creativity, their wishes, aspirations, ambitions, and expectations for their countries, of having, in the end, better conditions for communities, for vulnerable groups, and a transition to a better world without leaving anyone behind.*

I again would like to thank you for all your support.

*Dr Geertje Schuitema, Director of the ReSToRE International Summer School*



## Table of contents

ReSToRE 2 Sponsors and organisers	3
Foreword from ReSToRE Director, Dr Geertje Schuitema	4
Table of contents	5
The ReSToRE Summer School	6
The participants	7
A week of creative, interdisciplinary discussion	9
Public lectures and group work	10
Working with communities	11
Workshops	12
Workshop A: Circular economy	12
Workshop B: Just Transition	14
Workshop C: Artisanal mining	17
Workshop D: Stakeholder engagement	20
Workshop E: Action leadership	22
Highlights from participants	25
Other outputs from the Summer School	35
What's next? Keeping the conversation going	35
Further information	35
Expert mentors and speakers with public abstracts	36
Organising committee	45
Press coverage	47
ReSToRE Programme	50

## The ReSToRE Summer School

Our reliance on the Earth for water, energy, and minerals significantly affects climate change, economic prosperity, the environment, and human health and wellbeing. There is an urgent need for a wider discussion on how to resource present and future generations in a sustainable way, and interdisciplinary conversations are crucial in addressing these issues.

50 early-career participants from 19 developing and 11 developed countries and a wide variety of disciplines came together to discuss these issues in University College Dublin from 4 to 8 July 2022. Ten expert mentors representing a range of disciplines contributed considerably to the Summer School. Each gave a public talk and helped to facilitate group discussions and workshops during the week. The event was made possible by financial support from Boliden, First Quantum Minerals, Freeport-McMoran, Rio Tinto, Teck and Glencore, as well as IUGS and iCRAG, under the patronage of UNESCO.



*L-R: Shalongo Angula, Linda Jaramillo, Tristan Childress, Dr Geertje Schuitema (Director of the ReSToRE International Summer School) Yan Wang, Irene Del Real, Aileen Doran, Rakiba Sultana.*

The 2022 Summer School builds on the success of the inaugural ReSToRE, which was held in University College Dublin from 1 to 5 July 2019, when 42 postgraduate students and early career practitioners from 28 nations, including 18 developing countries, met to discuss the challenge of sustainably resourcing future generations.

Further information on ReSToRE 2, including a video about the Summer School and links to all the public lectures, is available on the ReSToRE website, which is hosted by iCRAG: <https://www.icrag-centre.org/restore/>

## The participants

The Summer School brought together 50 early career researchers and professionals from around the world, specifically from 10 developed and 19 developing countries, based on the UNCTAD classification of economies<sup>1</sup>.

<b>Country of origin</b>	<b>Number of participants</b>
Algeria	1
Bangladesh	1
Brazil	1
Chile	2
China	3
Colombia	4
India	1
Iran	1
Kenya	2
Lesotho	1
Namibia	4
Nigeria	1
Papua New Guinea	1
Philippines	1
South Africa	1
Sudan	1
Tanzania	1
Tunisia	1
Zambia	2
Australia	1
Canada	3
Denmark	1
Finland	2
Germany	3
Ireland	4
Italy	1
Rep. of Korea	1
UK	1
USA	3

*Participants' countries of origin*

---

<sup>1</sup> <https://unctadstat.unctad.org/en/classifications.html>



*Countries of origin of Summer School participants and mentors (credit: MapChart.net)*

Participants in the Summer School were selected from a highly competitive pool of more than 120 applicants. Financial support was available for some of the delegates thanks to sponsorship from global organisations such as UNESCO and the IUGS, as well as industry sponsorship of Boliden, First Quantum Minerals, Freeport-McMoran, Rio Tinto, Teck and Glencore.

About one fifth of the delegates came from the extractive industries (i.e., mining, petroleum and related services) and the remainder from academia and government. They were all early career professionals, which is defined as being within 10 years of their last degree.

Collectively, participants' expertise included geology, environmental management, environmental psychology, anthropology, sociology, data science, law, engineering, hydrogeology, and political science. Sixty-eight percent of participants identified as female, and 32% identified as male.

#### *Expert mentors*

The international lecturers came from four continents to share their expertise in the geosciences, environmental psychology, policy and law, and cultural anthropology. Detailed information on the lecturers is given on p. 36.

## A week of creative, interdisciplinary discussion

This Summer School is "one of the truly interdisciplinary Summer Schools that I've been to where people have so many different backgrounds," said Prof Wouter Poortinga, from Cardiff University, UK, expert mentor and co-leader of the workshop on stakeholder engagement. He said that putting people from different backgrounds together and giving them quite complicated problems and topics to work on is "very stimulating, and it will help them later on."

We cannot solve the wicked problems with one discipline, and this Summer School "is all about breaking the silos," said expert mentor Dr Aparajita Banerjee, based at University College Dublin. By the end, "students will be able to communicate with each other and that's a big learning. It will be the beginning of a new way of thinking, I'm very hopeful about that." she said.

"The combination of people from geosciences and people from a range of social sciences is fantastic in terms of creativity and simply breaking down language barriers and working together. It gives you hope," explained former IUGS Councillor, Edmund Nickless.

"Lack of formality means people are prepared to engage, commit to it, take it seriously and relax," said Edmund. "The group dynamic is fantastic to observe. They have come with open minds and the degree of commitment is very high. They come prepared, they are interested and they work hard," he said.

"They are the next generation of leaders and influencers in their countries. It's extremely gratifying that the first group *[from ReSToRE 2019]* are still in touch, and the same will happen this time. In many ways, this experience will be with them for the rest of their lives. That's why it's worthwhile doing," he said.

"It's nice to group together young professionals full of energy. You can feel that energy. It's also really important to hear different opinions from other disciplines," said Mauricio Durán from First Quantum Minerals, sponsors of the stakeholder engagement workshop (Workshop D).

"It's a very diverse group," said Michael Huehne, general manager for exploration at Freeport-McMoRan, sponsors of the action leadership workshop (Workshop E). The diversity of disciplinary backgrounds, including social scientists, geoscientists, and psychologists, "gives a great all-round perspective particularly in terms of perceptions of the mining industry," he said.



## Public lectures and group work

During the week, participants' time was split between plenary talks and workshops. Each expert mentor gave a plenary, public talk which was live streamed for those who could not be there in person. Talks and workshops were held in University College Dublin's Quinn School of Business, where a lecture theatre and many classrooms, meeting rooms and informal seating areas were available to delegates.

On Day 1, participants were split into groups and assigned to one of five workshop topics, based on their preferences declared in advance. The workshop topics were: circular economy, just transition, artisanal mining, stakeholder engagement, and action leadership.

The workshops consisted of participant-led group work, which was facilitated by two expert mentors per workshop, one with expertise in the social sciences and one with a geoscience background. Participants utilised a mix of brainstorming, structured discussion, role-playing, smaller group discussion and time for reflection to explore their topics.

Each workshop was sponsored by an industry partner or organisation, with sponsors providing suggestions on Day 1 for questions to explore and real-world problems to discuss in the workshops. On Day 4, the groups mixed and integrated in order to make the most of interdisciplinary connections and gain new ideas and perspectives.



*Workshop participants mixing on day 4.*

The highlight of Day 3 was a field trip to Howth, Co. Dublin, when Prof John Walsh and Prof Julian Menuge of UCD's School of Earth Sciences and iCRAG took them to various geological points of interest. This gave participants a break from the classroom setting and an opportunity to see some of the Irish landscape and taste a bit of Irish culture at an evening group dinner with live Irish music.

On the final day of the Summer School (Day 5), each group presented their findings to all participants, mentors and sponsors, with time for discussion and questions.

All participants received certificates of attendance to the Summer School on the final day.

## Working with communities

One theme common to all workshops was that of community engagement and how researchers and professionals can partner and work with communities to progress sustainable extraction of materials and other resources.

"There are reasons why communities are concerned about mining. Communities know what mining does. They understand mining," said Dr Gavin Mudd, from RMIT University, Australia, expert mentor co-leading workshop B. "The more progressive parts of industry recognise communities have a legitimate concern. To me, that's what's really inspiring about these meetings. You get to discuss all these issues, but people also get the fact that these issues are legitimate and we can find solutions for them," he said. Through an interdisciplinary approach you can start to make connections and come up with different ways of doing things, he said, adding that "getting the next generation together is really important as they are the ones dealing with communities and regulators, providing advice within companies or working as a regulator."

The topics are very well connected, said Prof Judy Muthuri, from Nottingham University, UK, an expert mentor and co-leader of Workshop C. "Our method is participatory," she said, speaking of the research she presented in her public talk on sustainable artisanal and small-scale mining in developing countries. Using a case study on gemstone mining in Kenya, she presented the process of building a collaborative network to enable mining stakeholders to re-imagine and co-create a shared sustainable future. "When trying to identify our research methodology, it's important to understand the context, but also who it is we are engaging with and the role they play in that research. For me, you are researching a question of social justice, marginalisation, participation in governance. It's not just about asking them questions, but using the research process to give them voice and agency. It's not just using research to get data, you are using research for impact," she said.

"Whenever we are thinking of working with marginalised communities who may not have power or agency or may be illiterate or semi literate or may not understand the English language, how do you use their resources, their knowledge and tools they have? It's making sure you are using their everyday lived experience and how they express it. It's about capitalising on what they know best and how they know," she said.

# Workshops

## Workshop A: Circular economy

Workshop Sponsor: International Union of Geological Sciences

Workshop leaders: Frances Wall; Jyoti Ahuja.

Participants: Ahrum Hyung; Diab Hamida; Leeysmo Hulijeli; Louise Randers; Morgan Irons; Nelao Naimbale; Päivi Haaranen; Rethabile Kheleli; Shalongo Angula; Tristan Childress.

Challenge: We will need a greater range and higher quantities of metals and minerals than ever before if we are to combat climate change and continue to develop our digital world. This includes goods such as electric vehicles, wind turbines, solar panels, smart phones and laptops. Some of these metals and minerals, for example lithium, cobalt and rare earths are critical. Discovery is difficult, dominated by just a few countries and responsible development and extraction present many challenges. It is essential to combine additional extraction with a reduction in the impact of using these Earth resources by systematic changes to more aggressively reduce, reuse and recycle Earth's resources, in what is commonly referred to as the circular economy. A 'circular' supply chain aims to design out waste by extracting the most value out of resources and materials whilst in use, and with good materials stewardship, capture and recycle at end of life. How can a company introduce a circular model for critical raw materials? Who should own metals? What are the legal boundaries? What are the new business models? And how do consumers drive and respond to such changes?

Approach and questions:

Participants' backgrounds included geology, soil science, agriculture, environmental science, and psychology. The group started from discussing the definition of circular economy.

Participants were interested in investigating connections between mine production and agriculture. On this basis, they created a research proposal to investigate circular economies between mines and agricultural-based communities.

The following research questions were considered:

1. What are the material and energy by-products in mining and agriculture activities that can be integrated in the circular economy (CE) model?
2. How are the potential synergies in the CE model perceived by stakeholders?

The group has these three aims in mind during the course of the workshop:

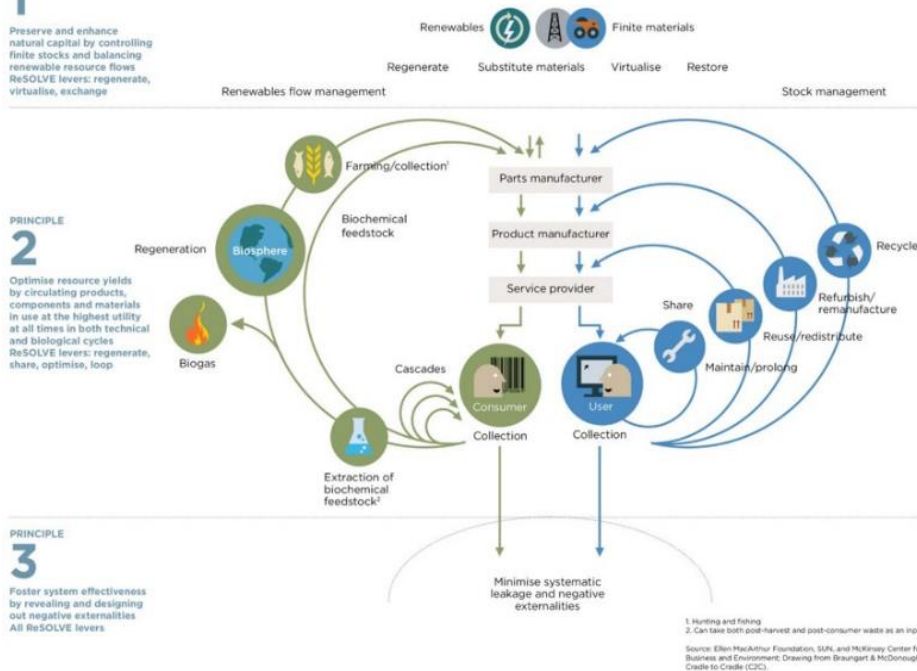
1. Understanding the network of mining
2. Understanding the network of agriculture
3. Identifying potential synergies between agriculture and mining in terms of CE

## OUTLINE OF A CIRCULAR ECONOMY

### PRINCIPLE 1

# 1

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows  
ReSOLVE levers: regenerate, virtualise, exchange



Diagrammatic representation of circular Economy. Source: Ellen Macarthur Foundation.

Participants decided to focus on water and explored the case for water circular economics, and selected two locations, Papua New Guinea and Algeria, as case studies.

### Key messages and outcomes

The group developed and presented a research proposal entitled IMPACT, Investigating Mine Production and Agricultural Circular Transitions.

They identified two research questions:

- What are the network pathways, inventories, and by-products in the water value chain within a landscape containing a mine in production and a local agricultural-based community?
- Which needs or common interests of the mining and farming communities can be met by integrating activities surrounding water?

Two phases of study design were presented:

- Phase 1: identification of stakeholders and interviews; life cycle assessment of current mining, agriculture and related activities.
- Phase 2: running of cultural animation workshops to build trust among stakeholders

Overall expected outcomes include the real-world testing of the IMPACT-model to generate a solid framework for communities, organisations, companies, and other stakeholders to use in their site-specific cases.

The group hopes to continue their work, publish the results of their proposal, and collaborate with teams in other workshops.



## Workshop B: Just Transition

Workshop Sponsor: Department of Housing, Local Government and Heritage

Workshop leaders: Gavin Mudd; Aparajita Banerjee

Participants: Ailly Sheehama; Andrea Carlino; Constanza Araya; David Cavell; Frida Sanga; Hana Ben Mahrez; Irene del Real; Jessica Walters; Omid Saremi; Salma Hamed.

Challenge: The transition to a low-carbon energy system is seen by many as an important step with many advantages for our climate. However, there is a flip side to this transition in that specific, often vulnerable, groups in society may bear a disproportionate burden in such a transition. To address these concerns and ensure that vulnerable groups are not disproportionately impacted, the concept of a 'Just Transition' is widely embraced. However, it is unclear what a Just Transition means and how it can and should be implemented. How do different stakeholders perceive a Just Transition? How can industries and others anticipate the need for a Just Transition? What would an efficient Just Transition process look like? What role should impacted communities play in defining a Just Transition?



*Just transition workshop participants.*

### Approach and questions

The group started by asking what a just transition means, and considered the following questions posed by the workshop sponsor:

- How would you advise a government ministry to develop and implement a Just Transition Framework in a situation such as the peat industry?
- How should geoscientists and social scientists interact? How might both groups frame a strategy?

The group members used a mixture of independent research, teamwork and group discussion to create and present a framework for a just transition.



## Key messages and outputs

- Given the global threats we are facing, including climate change, pollution and biodiversity loss, there is a need to transition from a 'business as usual' way of doing things to alternative industries. But this transition must not be at the expense of specific sectors of society and those most vulnerable. And most significantly, involve a strong partnership between social scientists and geoscientists.
- A Just Transition is the equitable distribution of costs and benefits of climate action - ensuring that this transition (the shifting economy) is done in a just, fair way.
- The group identified economic, environmental, social, ethical, cultural and historical aspects as being key in driving the just transition.
- They proposed a framework underpinned by three distinctive features: community participation in all stages of the decision-making process, independent auditing and a partnership and knowledge exchange between subject matter experts in social, earth and environmental sciences.
- The framework is divided into three phases: pre, during and post transition.
- All three phases are overseen by a multi-stakeholder forum with representatives from each stakeholder group, with participatory research informing the composition of the forum
- In the pre-transition phase, social and earth scientists gather primary data to inform the process and the make-up of the multi-Stakeholder body.
- In the transition phase, training, education and reskilling take place to meet the needs of the community, overseen by independent auditors.
- The post-transition phase consists of independent review and assurance of the process to see if it has been "successful" in the view of stakeholders. Based on this, accreditation can be given and/or corrective actions made.
- Community participation is integral to all three phases.
- Participants discussed case studies from Germany, one successful and one unsuccessful.
- The group also developed a Just Transition risk tool, a prototype to assess risk in the just transition and to integrate geoscience and social sciences perspectives.

The group intends to integrate and develop their framework and preliminary findings into a white paper after the Summer School and in collaboration with other ReSToRE participants.

### **David Cavell, workshop participant**

*"Our workshop on Just transition has gone from something we have been thinking about in a highly conceptual way, how do we include people, who is in charge, who has the right to say yes or no to projects, how do communities cope when an extractive industry closes and a new industry comes in, and how do we make sure that's equitable. From that, we've developed a framework and process for ensuring that all stakeholders are at the centre, that subject matter experts are involved, and that it's backed up by research in the social and earth science aspects of that context, region and community, you end up with a framework for evidence-based policy and involvement of all key stakeholders needed."*



*Just transition workshop participants during brainstorming sessions.*

## Student Blog extracts

### Blog 1

David Cavell

Hello and welcome to my first blog on ReSToRE! I'm Davey, a geologist at heart working in Environment and Sustainability. I'm thrilled to be at the Summer School: Over 30 countries are represented from almost every continent, with backgrounds ranging from geoscience to soil science to law to sociology. So far, over desks and over dinner, we've started to get to know each other and share perspectives. I find myself buzzing to learn with every new conversation.

And there's plenty of food for thought - We have a great selection of experts on circular economy, artisanal mining and critical metals to guide us, and had two more excellent public lectures on Tuesday.

Nicole Smith from the Colorado School of Mines guided us through social science research on mine closure and repurposing of mine sites in the United States. The talk included some interesting ideas for repurposing of the mine, ranging from making glass out of tailings to shrimp farming to CBD growth (as these products are legal in Colorado). Most interesting though were the differences of perspectives between stakeholders (ranging from communities around mine workers to state governments) of the mine, and how the preference and importance of economic, social and environmental considerations differed between each. Clearly, mine stakeholders are seeing the issue of closure in many different lights; perhaps through the prism of good stakeholder engagement and social science research these can be understood and reconciled.

Frances Wall gave us a view from the extractive industries at the "front" of the circular economy (CE), an area often neglected in CE models. It was great to hear about the volume of research in the UK in this area, through interdisciplinary projects like [Met4Tech](#), and the launch of the [Critical Metals Intelligence Centre](#). Close to my heart was discussion of sustainability reporting and how we might track metals from source to product, Life Cycle Assessment and ultimately have better stewardship of metals we use.

Over the week, the Summer School breaks up into smaller workshop groups each tackling a particular thematic issue. I'm lucky enough to be part of the group looking at how a "Just Transition" to a low carbon economy might be achieved. Transitioning to a low carbon economy is crucial to our future (of which mining will form a key component), but this process

will lead to large economic and social changes for the developed and developing world, with whole industries winding down, new ones springing up – In short, winners and losers. So how to achieve a just transition for the communities impacted? Well, you'll just have to stay posted to this blog to find out...

## Blog 2

Constanza Araya Ibarra

Half of the Summer School has gone by and it's been great so far. The Just transition workshop group includes people from Australia, Tunisia, Iran, the UK, Italy, Chile, Sudan, and Tanzania. And even though it was challenging to make some decisions at the beginning, we are starting to see some results now. When it is needed, there is some small group research, but most of the time, we are all discussing, listening to each other, asking questions, taking some notes, and shaping our framework for the final presentation on Friday. And having people with different backgrounds, styles of work, histories, and interests has been a challenge but, most of all, an inspiration. I've been inspired by people's creativity, their wishes, aspirations, ambitions, and expectations for their countries, of having, in the end, better conditions for communities, for vulnerable groups, and a transition to a better world without leaving anyone behind.

## **Workshop C: Artisanal mining**

Workshop Sponsor: AstonECO Management

Participants: Aileen Doran; Bethel Ukazu; Johanna Ithindi; Laura Smith; Linda Urrego; Victoria Susin; Wenting Huang.

Workshop leaders: Judy Muthuri; Bunting Williams.

Challenge: Artisanal and Small-scale Mining (ASM) is an important source of income for millions of people. ASM is characterised by informal practices, often driven by small family groups working together to mine and sell commodities such as gold, gemstones, cobalt and coltan. Due to its informal nature and a dire lack of resources, ASM has been associated with environmental challenges, occupational health and safety issues, and a lack of transparency when it comes to ASM's role in the supply chain. How (and should) might informal artisanal and small-scale mining workers and employers be better integrated into the formal mineral supply chain? What type of social protection are needed and how should their social security be guaranteed? What roles do local government (communities), regional or national government, companies, NGOs and end-use consumers play in improving the ethical and sustainable practices of ASM?

### Approach and questions

The group was invited to consider the following questions:

- What does sustainable artisanal mining look like?
- Considering a guidance [document](#) on how large scale mining can engage with small scale and artisanal miners:
- What are the 5 things you like most in this document? And why?
- What are the 5 weakest points? And why?



*Participants in the Artisanal Mining Workshop.*

Participants started by asking what artisanal mining is and what it looks like in the context of sustainable development. They noted that a definition is difficult to arrive at, given that artisanal mining is very context specific. Depends on geography, method of extraction, depth, size of the area, type and amount of commodity, and the nationality of the miners.

Group members reflected on their own perceptions of artisanal mining. Some group members had negative perceptions of artisanal mining, but this changed during the course of the week, as they realised the complexities around artisanal and small scale mining. For example, the group noted that artisanal mining is vital to many communities, the supply chain, and often formal or in the process of being formalised.



*Workshop C expert mentors Bunting Williams (L) and Judy Muthuri (R)*







Issues to explore include:

- What is the relevance of ASM in supply chain and circular economy?
- What does sustainability mean to ASM?
- Who is holding large scale bodies to account?

In the words of one of the workshop participants:

**Aileen Doran, postdoc at iCRAG in University College Dublin, originally from Ireland.**

*I've been working on artisanal mining. I learned an incredible amount. It brought up a lot of interesting questions in terms of ethical values because there is a perception that artisanal mining is really negative and needs to be banned, but that's not really helpful to a lot of people who depend on this for their livelihood and who do it legally and there might be no other alternative. That might be an entire community or family without a support structure or income. So we need to think about how to do this in a better, more responsible way rather than banning it, because we need solutions. Ethically sourcing materials is actually very complex, it needs more thought and consideration.*

## **Workshop D: Stakeholder engagement**

Workshop Sponsor: First Quantum Minerals

Workshop leaders: John Thompson; Wouter Poortinga

Participants: Bianca Neumann; Catalina Londoño; Cynthia Sitati; Claire Geel; Clara Marquez; Dean Allister; Dessa Madarcos; Janina Fuchs; Lesly Stokes; Sarah Hatherly; Andrew Sakala.

Challenge: Mining communities face many challenges, depending on the type and scale of mining activities that take place. When companies are involved in mining practices, local communities and other stakeholders often feel challenged by the perceived social and environmental impact of these activities. Even if they comply with formal government requirements, mining companies often struggle to obtain what is commonly referred to as a Social License to Operate. In this workshop a case study from an early-stage exploration programme in South America is presented. How can the interests of companies and indigenous communities be balanced? What is the role of national and local policies and politics? What roles should NGOs play?



*Participants in the stakeholder engagement workshop.*

### Approach and questions

Participants were invited to consider a real-world case study from a copper mining project in Chile, in an area where there had been a history of conflicts between the local community and various mining and water projects. Delegates considered how to communicate with the community, what a sustainable solution might look like, and what the role of central and local government should be.

Specific questions considered included:

1. What does the audience/stakeholder group currently perceive about mining; in particular, what are the grievances?
2. How does the industry establish a position of trust, by first seeking and listening to those?
3. What is the stakeholder's understanding of sources of their raw materials?
4. What is the most effective contemporary mechanism/medium to engage in this dialogue?
5. How can public perception be used as a driver of change in the industry?

### Key messages

The group presented their thoughts and perspectives on stakeholder engagement through creative role play. They presented various scenes through which they explored the role of community members, mining company geologists, the community chief and a social coordinator.

The group came up with several key messages that could be applicable to any exploration project.

These included:

- To build trust with communities, it is important to create of a safe space to hear their needs.
- It is important to show authenticity and respect in words and actions.

- True stakeholder engagement creates meaningful conversations that help projects and people grow.
- Social engagement has no definite timelines.
- It is important to understand the values, beliefs and social norms of the community.
- When conflict keeps escalating, and your efforts to make engagements with the community and leaders fail repeatedly, the company may need to make a decision to walk away.
- Field trips, social engagement workshops, mentorship, training and education can all help understand the needs of communities.
- Stakeholder engagement must be ongoing. It is a continuous process of learning, assessment, re-assessment, and engagement.

### Student blog

Sarah Hatherly

It is a pleasure and a privilege to be a participant in the ReSToRE 2 Summer School. Having a multidisciplinary group with such a diverse range of backgrounds creates an incredible environment to foster ideas, creativity, and learning. 30 countries are represented across 50 participants, with a wide variety of both academic and industry disciplines (including Earth science, mining, environmental policy, psychology, engineering, anthropology and more). Each person has a unique background and perspective to bring to the table.

Over the past few days, we have had public lectures on topics including Sustainable Development & Global Transitions, Assessing Sustainability in Mine Closure & Repurposing, Circular Economy, Carbon Neutrality & Prosperity, and Collaborative Action for Sustainable Artisanal Mining. These presentation topics align with the specific challenges of the workshops that participants are split into. My favourite part of these lectures is realizing how connected all of these topics are. Each of our workshop challenges relate to one another, and forming those connections and discussing them with other Summer School participants leads to many interesting conversations.

I am part of the Stakeholder Engagement workshop, looking at a case study (and the bigger context) to establish community engagement strategies to improve social acceptance and allow companies to be involved in mining practices. Obtaining a Social License to Operate can be challenging due to stakeholders' perception of mining activities. The workshop is conducted as an open-format collaborative effort. A lot of brainstorming and problem definition has been done by our group the past few days. Some of our group members are quite closely related to the case study (working in the industry, from the country of the project), while others bring relevant experience with NGOs, policy, environmental assessments, and more. We are constantly learning from each other's experiences and how they have shaped our points of view. There have been many exciting moments and breakthroughs as ideas come together that none of us would have thought of individually. I can't wait to see the implications of our work.

### **Workshop E: Action leadership**

Workshop Sponsor: Freeport-McMoRan

Workshop leaders: Adam Simon; Nicole Smith

Participants: Jaakko Georgi; Dominic Taccolini; Josianne Kollmann; Lynne Doyle; Luis Pizano Wagner; Mengdi Pan; Mukuka Simusokwe; Paulina Fernández; Rakiba Sultana; Yang Wang

Challenge: Mining and metals are critical to society, providing the vital elements of every aspect of economies: building and construction, vehicle manufacture, electronics and

communications, healthcare, food production, and energy production and transmission. Further, transition to a low-carbon future requires significant growth in demand for a wide range of minerals and metals such as copper, lithium, and cobalt. Amidst this growing need, the mining industry faces a plethora of negative perception issues, tied more to its historic roots than its current operating standards: unregulated environmental impacts, dangerous working conditions, lack of diversity and inclusion, use of antiquated technologies, and destruction of traditional livelihoods. The industry faces growing demands often follow strict regulations to minimize impacts. yet the industry has a poor reputation and faces public opposition in many regions. How does the mining industry as a whole establish a position of trust? What is the public's understanding of raw materials use and sources, and what drives the dominantly negative perception? What is the most effective contemporary mechanism/medium to engage stakeholders? How can public perception be used as a driver of positive change in the industry?



*Participants and mentors in the Active Leadership workshop.*

### Approach and questions

Through structured discussions and brainstorming, the group considered the following questions:

- What does the audience/stakeholder group currently perceive about mining; in particular, what are their grievances?
- How does the industry establish a position of trust, by first seeking and listening to those?
- What is the stakeholder's understanding of sources of their raw materials?
- What is the most effective contemporary mechanism/medium to engage in this dialogue?
- How can public perception be used as a driver of change in the industry?

Participants discussed and shared experiences from case studies in Zambia, Germany, Chile, Finland, the US and China. On Day 3, the group decided to focus on two different stakeholder groups, government and the general public, as different methods and approaches would be needed for each.

### Key messages

Overall, the group considered how trust can be built and in some cases regained in the context of mining. They noted the importance of active listening and giving people agency and voice.

Here are some key messages from their final presentation:

- Communication must be relevant and appropriate.
- Listening to and engaging with stakeholders takes time and engagement must be meaningful. It is important to listen and hear people.
- It is important to engage early with communities and choose carefully who is engaging. It is useful to find someone impartial who communities trust.
- In order to build trust, it is important to showcase competence and emphasis benefits without denying possible negatives.
- Drivers of public acceptance include: trust, perceived procedural fairness and perceived distributive fairness, confidence in governance, communication quality and perceived benefits outweighing the costs and risks.



## Highlights from participants

Participants really enjoyed the mix of lectures, workshops and the vibrant social programme. The friendly atmosphere and diversity of participants, as well as the quality of the lectures, were among the highlights for most people. The field trip was particularly enjoyed by many of the participants as well. Overall, participants felt enriched and gained new ideas and perspectives, as well as making new friends and gaining a network from the Summer School. Their words below capture some of their thoughts and enthusiasm during the week:

**Leeysmom Hulijeli, geologist and PhD student at Akita University, Japan, from Papua New Guinea**

The workshop has really opened my mind and showed me how little I know. Looking at the global challenges we face, I realised how important it is to integrate geology, engineering and social sciences, environmental studies, and health and safety. I've come to have a greater appreciation for interdisciplinary studies and develop skills and networks that could help me in the future. There are intense periods of learning and sharing of ideas. But there are fun social events which give us a chance to interact outside of the classroom. It's not just about academia and knowledge, I've really begun to appreciate Irish culture.



**Josianne Kollmann, postdoctoral researcher and environmental psychologist, Eawag, Switzerland**

I really liked the combination of geoscience and social science at the Summer School. I think it's really important to combine the two subjects, and it was really good to see that so many people with a geoscience background were so happy to learn about what we are doing in social science and that they feel it could influence their work in a good way.



**Andrew Sakala, graduate exploration geologist, First Quantum Minerals**

The interaction between people from different countries is awesome. I've learned so much. For example, there is a need for more community engagement from the mining industry if we are to meet our net zero targets.



**Linda Urrego, anthropologist and mining engineer and PhD student at the Colorado School of Mines, originally Colombia**

I cannot describe it. It is a great experience. Not only the lectures, they are super good, and I like that we are looking at real problems and trying to give our opinion, perspectives on how these companies can address these issues. Everyone has their own experience and background. The multidisciplinary of this event is amazing. For instance, in the context of artisanal small-scale mining, the social sciences are key. If you don't consider people's cultural perspectives and mindset, you will fail. For example, in Colombia there are many projects training miners on impacts of mercury, but sometimes there are cultural or trust issues that we need to address.



**Jaakko Georgi, First Quantum Minerals, Finland, from Finland**

It's very refreshing to hear opinions and views from people not within the industry. When you work in a certain environment you get bogged down with certain views. It's been really nice getting to know new people after a long time due to covid, and talking about interesting topics. The mining industry has a big problem in its hands. People don't trust it. And there are historic good reasons for that. Building trust takes a long time and if you've lost trust it's hard to get it back. So it's very important to try and figure out what the next steps will be.



**Shalongo Angula, water quality engineering student at University of Cape Town, South Africa, originally from Namibia**

It's been really exciting. It's the first time I've been involved in interdisciplinary research. The workshop made me realise we need to work with the input of other disciplines. Different disciplines need to come together to find common ground. I am grateful for the opportunity to attend. I hope to keep in touch with my fellow participants - their level of professionalism and willingness to contribute to any topic really stood out to me. Everyone was willing to learn.





**Dean Allister, Teck Resources**

I'm finding the workshops very interesting and very applicable to my own role. There will be a lot to take back from a communities perspective.



**Wenting Huang, researcher in economic geology from Nanjing University, China visiting Trinity College Dublin**

The lecturers are very inspiring and my workshop is on artisanal and small scale mining. Previously some of my research samples came from those industries. I didn't realise how important they are to the economy, society and global development. There are a lot of problems in that industry and we can do something about this. It's very good to know that everyone caring about these issues, like people in this Summer School, are trying to find ways of making things better.



**Johanna Ithindi, environmentalist and water resource manager at University of Stellenbosch, originally from Namibia**

I'm learning so much from everybody. I like how diverse this meeting is. The sharing, the collaboration and teamwork, the food, the fieldrip, and how the team goes out to see the city in the evenings. I also finally got to see a fossil embedded in a rock for the first time!



**Andrea Carlino, PhD student in environmental engineering in Politecnico di Torino, Italy**

I'm enjoying the lectures, the workshops and the field trip. Our guide is very passionate about the subject, so it's very enjoyable!



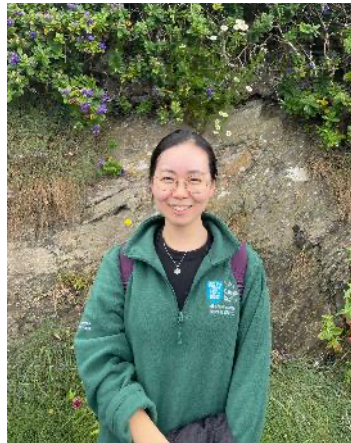
**Rakiba Sultana, PhD student in hydrogeology from Bangladesh**

The programme is so diverse, with people from all over the globe so we have different perspectives. That's very interesting. I like the workshops where we are brainstorming about why people are against mining, and thinking of solutions.



**Ahrum Hyung, visiting student at Trinity College Dublin, originally from Korea**

I didn't have positive perceptions about mining, but at the same time I knew it was necessary for renewable energy in the future. This course gave me a different insight. My workshop is on the circular economy and I'm very interested in how to recycle and reuse mining waste. Through this Summer School and through meeting different people from different fields, I'm learning a lot. Geology is not only for scientists. I highly recommend this school for people even without a science background.





**Claire Geel, postdoc at iCRAG in University College Dublin, originally from South Africa**

I absolutely loved this Summer School. As a geologist, I work a lot in the lab and I don't interact with social scientists often, or don't often deal with the issues we are talking about during this conference. It's been an eye-opening experience. My workshop is in stakeholder engagement and I realise I would like to do some courses on communication and how to understand the needs of communities we work with.



**Aileen Doran, postdoc at iCRAG in University College Dublin, originally from Ireland.**

The Summer School brings such a diverse group of people with so many different backgrounds and experiences together, not just geographical background, but also subjects and career backgrounds from law, engineering, social sciences, geology. It's really valuable because we need to bring all these people and stakeholders together if we want to make change. I've really enjoyed meeting so many people from all over the world. It's been an opportunity to meet people with completely different career backgrounds and broaden my perspectives. It's been really nice being able to meet new people and integrate, especially during an in-person event after so long.



**Hana Ben Mahrez, sedimentologist and hydrogeologist at Eötvös Loránd University, Budapest, originally from Tunisia.**

This Summer School has opened my eyes in so many ways. We hear about sustainability and just transition and recycling, but in this school I could meet so many professionals in these fields from all over the world. Their vision is different. I am looking at the topic from a totally different point of view. In hydrogeology I'm looking into pollution and geothermal energy. The role of regulations and how they work, industries should think more about sustainability while creating the product itself and not wait until its end life to think about how to recycle it.



**Laura Smith, student at Technological University Dublin also working with Geological Survey Ireland, originally from Ireland**

The thing that shocked me the most is how international the group is. For instance, it's been really good to hear international opinions on mining. Ideas that keep coming up include the importance of engaging with communities and with the government, and the idea of enforcement. Who is going to enforce all these ideas that we are coming up with? Is it government or industry? It is easier to find common language once you've been engaging with people socially as well.



**Victoria Susin, PhD student at the School of Earth Sciences in University College Dublin, originally from Brazil.**

I'm very interested in how the field of mining can contribute to sustainability and help to tackle environmental problems. The topics of the Summer School are mainly about mining and all of them are so important and connect really well. Today it was a really nice initiative to mix all the groups, to listen to other ideas and think how we can use them in our own workshops. I plan on working in industry after my PhD, and I think these ideas will be super applicable.





**Nelao Naimbale, production geologist for Sperrgebiet Diamond Mine, Namibia**

I'm learning a lot. All the workshops are connected. My highlight is that we have people from so many different disciplines coming together to tackle issues around the green economy and exploration for critical raw materials. For example, I am interested in graphite, one of the major products in lithium ion batteries.



**Irene del Real, assistant professor in economic geology at the University of Chile, originally from Chile**

One highlight has been learning a lot about concepts I knew existed but did not have the chance to develop ideas about before. It's very inspiring and motivates me a lot. In our workshops, we are having very important and profound conversations about these important concepts, but we are all different, with different personalities and we've never worked together before, which is a challenge but also a great highlight.



**Janina Fuchs, masters student in environmental economics and energy policy at University College London, originally from Germany**

It's really nice to see people from industry here, as well as people from all over the world. It's great to meet people from different backgrounds and perspectives. It's a good mix of getting input from the talks and being able to work and exchange views and develop ideas in the workshops. In the workshops, out of the blue people come up with crazy stories from their work and everything is so relevant to our project. I loved the field trip in particular.



**Omid Saremi, research engineer at University College Dublin, originally from Iran**

This Summer School allows us to consider a problem from different points of view, for example the point of view of a psychologist, engineer, geologist. This is how to find better solutions. I made friends here and met scientists from all over the world. I think this Summer School will help to change our views and also find solutions. I really enjoyed the whole week!



**David Cavell, Taylor Woodrow, UK, originally from the UK.**

I work on environmental management and compliance in construction and infrastructure, and I have a background in geology and earth sciences. I have always been really interested in geology and its role in sustainable development. This is core to us solving and correctly altering our society to tackling issues such as climate change and biodiversity loss. I am really buzzing from this week! There have been so many amazing speakers and excellent talks, and new perspectives. Restore and the work iCrag is facilitating here is getting to the heart of these issues. Everybody is very energised. There is a lot for us to cover and do. I will definitely be sleeping on the plane!



**Luis Pizano, Beak Consultants GmbH, Germany, originally from Colombia**

Variety in background and nationalities is fundamental. I really like that this event is so inclusive. I really enjoy getting perceptions from the world of psychology and getting the social perspective of what we do. As geologists we lack this training in how to communicate with people and how to assess certain situations in an appropriate way.



**Salma Halmed, petroleum geologist in Ministry of Energy and Petroleum, Sudan**

I'm really enjoying meeting people from different backgrounds. When talking to people you realise the same story can be told from different angles. I really enjoyed the social events and learning about different cultures. I'm lucky to be able to join this event.



**Yang Wang, PhD student in paleoclimate visiting Trinity College Dublin, from Nanjing University, China**

I really enjoyed the brainstorming sessions we had in our workshop. There were no rules, no structure, and we could see how far we could go. We spent two days and a half on this. That was very interesting and a new experience for me. In China or during my PhD, we always had to think of a structure first, and this can be very limiting. We then spent less than one day finishing our presentations summarising our brainstorm results, so it was effective.



**Frida Sanga, geology masters student University of Dar es Salaam, Tanzania, originally from Tanzania**

The event was so nice. I'm learning a lot in my field. I like the way we interact with each other and that the school includes people from different areas. I've made a lot of friends from different countries. It's my first time to travel overseas so I'm really enjoying that.





## **Other outputs from the Summer School**

Participants were invited to blog about the event and several student blogs are available on the iCrag website here: <https://www.icrag-centre.org/restore/restoreblogs/>

Several participants expressed the intention to continue collaborating and write up publications summarising their findings, including a white paper based on Workshop B's work on the Just Transition.

Future outputs, including press articles, participant blog posts and news items will be listed on the ReSToRE website.

## **What's next? Keeping the conversation going**

A WhatsApp Group for the Summer School was created at the start of the event and has been very active. Participants also created a LinkedIn Group and Facebook group to continue collaborating and keep in touch.

The organising committee would welcome suggestions on how best to foster and expand the interdisciplinary community and collaborations that have emerged from ReSToRE 2 and ReSToRE 2019.

## **Further information**

A short video on ReSToRE 2, abstracts of public talks, participant blogs, as well as further outputs and resources are available on the ReSToRE website: <https://www.icrag-centre.org/restore/>

Recordings of the public lectures are available on the iCrag YouTube channel: <https://www.youtube.com/channel/UC3tldN4PyPRXkCSnXgieR0g>

All presentation slides from the ten public lectures are available for download here: [https://drive.google.com/drive/folders/1sKFYi5KYHQuzP0ICajCIZ\\_xhEk3PaAyg](https://drive.google.com/drive/folders/1sKFYi5KYHQuzP0ICajCIZ_xhEk3PaAyg)

Please email comments and suggestions to [restore@icrag-centre.org](mailto:restore@icrag-centre.org)

## Expert mentors and speakers with public abstracts

### Dr Jyoti Ahuja - University of Birmingham, UK



Dr Jyoti Ahuja is a Met4Tech Research Fellow at the Birmingham Law School, having recently moved over from the Faraday Institution ReLib project. Her research in Met4Tech examines legal and regulatory structures for creating a circular economy in technology metals needed for decarbonisation and digital technologies.

Her broader research interests focus on the law-science interaction. Prior to joining this project, Jyoti worked as a clinical psychologist in the NHS for several years, and is keenly committed to interdisciplinary collaboration for developing legal frameworks that are informed by scientific

evidence. Jyoti also teaches environmental law as a visiting lecturer at the Birmingham Law School.

### **Public lecture title: Electric vehicles and battery raw materials: why a circular economy is crucial**

**Abstract:** Green technology products such as electric vehicles and wind turbines are crucial for achieving climate-change targets. However, manufacture of these products will also require rapidly increasing quantities of critical technology metals such as lithium, nickel and cobalt. Thus green technologies will, alongside environmental benefits, also bring environmental challenges such as increased mining for critical minerals. This lecture will use the example of electric vehicle batteries to illustrate the challenges of green technology innovations. It will discuss why effective policies and legal frameworks are essential to make sure that we maximise net benefits from the electric vehicle (EV) transition, while minimising harms. Discovery of lithium in parts of the UK and rising demand for lithium-ion batteries has led to renewed interest in a UK mining industry, for example in places such as Cornwall. However, UK mining regulations are outdated and must be reevaluated if we want to harness this geological potential. Responsible mining regulations are necessary, but this alone will not be enough. Strong circular economy policies are also needed to manage critical materials demand, extract maximum value and ensure that these valuable minerals are recycled and returned to the supply chain at the end of life.

## Dr Aparajita Banerjee - University College Dublin



I am a Post-Doctoral Research Fellow, College of Business at University College Dublin. I received my Ph.D. in Environmental and Energy Policy from the Department of Social Sciences at Michigan Technological University, USA. In addition, I hold a MA in Economics degree from Jadavpur University, India. I am interested in research that examines the intersection of society, the environment, and government policies. I study socio-environmental problems at different scales local, regional and global. I have conducted research in countries like India, Mexico, Ireland, and the United States. My current research is inspired by the belief that societal transition to deep decarbonization and a sustainable future should truly be just and equitable for all. I am interested in exploring how society is impacted by wicked problems associated

with energy and environmental (in)justice, climate change inequality, and biodiversity conservation. I have published on topics like comparative public policy, social acceptance, and rejection of alternative technological developments, ethics of energy development. I also have an interest in exploring the challenges in achieving the UN Sustainable Development Goals at micro, meso, and macro levels.

### **Public lecture title: What, why and how of the term Just Transition: Conceptual review, importance, challenges, and opportunities**

#### **Abstract**

Countries worldwide are increasingly implementing policies to promote low carbon-emitting consumption and production processes. These policies upend the status quo in most sectors like mining, energy production, waste recycling, transportation, fashion, and other industries emitting carbon. As a result, new winners and losers are being created as societal groups differ in how they benefit or lose from the transition to a low-carbon future. The term Just Transition is often used in academic and policy domains to identify, account and address the inequalities in the distribution of pains and gains within society while moving away from fossil fuels. However, there is a lack of clarity and general awareness of what the term Just Transition stands for, why it is critical, and how it can be achieved. This lecture will introduce the concept of Just Transition and discuss in detail its criticality in the current context and what challenges need to be addressed to achieve a whole-of-society Just Transition to a low carbon future.

**Dr Gavin Mudd, RMIT University, Australia**

Gavin Mudd is a renowned global expert on the environmental sustainability of modern mining and brings together a unique set of multidisciplinary skills and knowledge to explore the challenges that the modern mining industry, governments, and communities are collectively facing. His mining research work includes environmental impacts, waste rock and tailings management, acid mine drainage, rehabilitation, mineral resource assessments, critical metals and minerals and sustainability metrics. The research always includes comprehensive and rich data sets. He is an associate professor of environmental engineering at RMIT University in Melbourne, Australia, where he has collaborated closely with assistant professor Simon Jowitt (UNLV) in recent years on the geologic aspects underpinning the environmental issues facing modern mining.



**Public lecture title: Setting the scene: Mining, sustainable development and transitions to meet global challenges.**

**Abstract:** Mining is an important industrial sector, providing the resources and energy we need for the modern world – yet it can come at significant social, environmental and economic risk. The world is currently working hard towards achieving the United Nations’ Sustainable Development Goals (SDGs) as well as global action on climate change. These broad themes present both fundamental challenges and opportunities for mining – but how do we frame these? What are the key trends driving the demand and supply for the variety of metals and minerals in the modern world? Where do we need to get to? How does mining address the need for strong environmental, social and governance (‘ESG’) performance, especially in the developing world? How do ESG factors already constrain mining and how much will they continue to affect existing mines and the potential development of new mines? How will the policy drive towards a more circular economy affect the need for mining? This presentation will delve into all of these issues and more! Whilst it obviously cannot deliver comprehensive answers, the meta-view should provide a compelling basis to understand and think about mining’s role in the modern world to help to contribute addressing fundamental needs such as the SDGs and climate change.

**Prof Judy Muthuri, Nottingham University, UK**



I am an Associate Professor of Corporate Social Responsibility in Nottingham University and the Chair of the Social and Environmental Responsibility Group which is mandated to drive the School's sustainability and responsible business agenda. I am a corporate social justice advocate who believes in working with diverse actors to co-produce research that has positive and sustained societal impacts. I am a Business and Society scholar with a great interest in theorising, understanding and influencing how organisations tackle sustainability challenges in different contexts - geography and industries. I am currently leading a Global Challenge Research Fund (GCRF) funded project on the co-production of sustainable artisanal and small-scale mining in Kenya using the cultural animation approach (visit <https://sustainable-asm.com> to learn more about the project). Prior to joining academia and the ICCSR, I worked in the civil society sector in Africa for over ten years where I played a pivotal role in the establishment of the Voluntary Services Overseas (VSO) South-South volunteering recruitment base in Kenya. I also worked for the National Council of Women of

Kenya spearheading its women and economic empowerment programmes. Until the end of 2015, I was a member of the Comic Relief's Trade Programme Advisory Group tasked with evaluating and recommending grant applications for international development in Africa. I continue to work towards building institutions and capacities of higher education and further education in Africa through my work as a founding member of the Africa Academy of Management, and the Africa Diaspora Academic Network-UK.

**Public lecture title: Strengthening collaborative action for sustainable artisanal and small-scale mining in developing countries.**

**Abstract:** The artisanal and small-scale mining (ASM) in sub-Saharan Africa contribute significantly to the global production of metals and mineral resources. A 2017 report of the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development estimated that the ASM produces a significant share of global supply of diamonds (20%), sapphires (80%), gold (20%), tantalum (26%) and tin (25%). The ASM sector is recognised as one of the most indispensable rural economic activities in resource-rich countries that contribute to employment creation, income generation and poverty reduction. Despite the potential for ASM to contribute to the socio-economic development of the African continent, the sector's economic importance is often disregarded in regulatory and policymaking processes because of its informality. Using a case study of gemstone mining in Taita Taveta County in Kenya, we share the lived experiences of disenfranchised mining stakeholders' and their efforts towards active participation in the governance of natural resources in the county. We discuss the process of building strong collaboration networks and platforms that enable mining stakeholders to re-imagine and co-create a shared sustainable ASM future.



**Prof Wouter Poortinga, Cardiff University, UK**

Professor Wouter Poortinga is a professor of Environmental Psychology at Cardiff University, and associate director of the Centre for Climate Change and Social Transformations (CAST). His research comprises human-environment interactions, with a specific focus on environmental risk perceptions and sustainable lifestyles and behaviour. Wouter has expertise in public opinion on future energy options and climate change, the role of environmental values and attitudes in pro-environmental behaviour, and psychological aspects of policy for behaviour change. Within the CAST Centre, he co-leads teams that work with partners and public participants to accelerate low-carbon transformations through individual and community-level interventions. Wouter is currently involved in a number of projects on changes in environmentally-relevant attitudes and behaviour, as well as the development of a toolkit for climate change engagement, in the wake of the COVID-19 pandemic.



**Public lecture title: Behaviour change for resource conservation**

**Abstract:** The behavioural choices we make and the way we live as individuals -and as societies at large- have a profound impact on our planet. Almost everything we do involves materials and energy that have been extracted, processed, and transported over large distances, which contributes to climate change, pollution, and environmental degradation. Behaviour change therefore has at least some role to play in resource conservation and climate mitigation. This presentation will give an overview of behaviour and behaviour change theories from psychology, as well as possible interventions to change behaviour for environmental purposes. It will compare downstream interventions that aim to influence individual decision-making directly (for example, through information provision) and upstream interventions that change the context in which decisions are being made (for example, by providing safe cycling infrastructure). The presentation will conclude that behaviour change can make an important contribution to resource conservation and climate mitigation, but that more system-wide changes are needed to attain environmental sustainability.

**Dr Adam Simon - University of Michigan, US**

Adam C. Simon is Arthur F. Thurnau Professor of Earth & Environmental Sciences at the University of Michigan. He earned degrees in geology from the University of Maryland and Stony Brook University, followed by a postdoctoral fellowship at The Johns Hopkins University where he investigated the formation of layered mafic intrusions in the Dry Valleys of Antarctica. Adam spent his first seven years as a faculty member of the University of Nevada Las Vegas where he worked on Carlin type gold deposits before moving to Michigan in 2012. He is a Fellow of the Society of Economic Geologists. His research program combines field, analytical and experimental work to unravel the formation of mineral systems that provide the metals used by society.



Adam co-authored two textbooks *Mineral Resources, Economics and the Environment*, and *Earth Materials: Components of a Diverse Planet*, and has published nearly sixty papers in the field of mineral resources.

**Public lecture title: Carbon Neutrality, Resources, Prosperity and other Musings.**

Presentation slides are available here: [https://www.icrag-centre.org/t4media/ReSTORE\\_2022.pdf](https://www.icrag-centre.org/t4media/ReSTORE_2022.pdf)

**Dr Nicole Smith, Colorado School of Mines, USA**

I am a cultural anthropologist and an Assistant Professor in the Mining Engineering Department at the Colorado School of Mines. My research interests include artisanal and small-scale mining; mining, sustainability, and social responsibility; rural livelihoods and mining developments; indigenous peoples; community development; and engineering education. Prior to my position in the Mining Engineering Department at Mines, I was a research fellow at the Centre for Social Responsibility in Mining at the Sustainable Minerals Institute at the University of Queensland and a post-doctoral scholar in the Humanitarian Engineering Program at the Colorado School of Mines.



**Public lecture title: Assessing sustainability in mine closure and repurposing: A case study from Colorado, USA.**

**Abstract:** Responsible mine closure and repurposing are key to contributing to sustainable development by ensuring successful environmental rehabilitation and reducing socioeconomic risks. However, mine closure has primarily focused on remediation and rehabilitation of mined lands with limited consideration of stakeholder perspectives and the broader social, economic, and cultural impacts of closure. In this talk, we propose a method for using stakeholder input to evaluate and compare three different repurposing alternatives for the tailings dam area of a mine in the state of Colorado, USA that is expected to close in the next twenty years. By using multi-attribute utility theory (MAUT), we show that it is possible to determine which alternative better reflects stakeholder preferences and results in the most sustainable outcome. Integrating stakeholder views into mine closure design and repurposing can lead to more responsible mine closure that is unique to a particular setting and stakeholder needs.

**Prof John Thompson, Cornell University, US (retired, now consultant, Vancouver, Canada)**

John has been dividing his time between Cornell University, where he has been the Wold Professor of Environmental Balance for Human Sustainability, and Vancouver, BC where he consults on exploration, mining and sustainability. John has worked in the mining industry and related research for 35 years, including Chief Geoscientist and VP Technology and Development for Teck Resources, and Director of the Mineral Deposit Research Unit at the University of British Columbia. He has had diverse leadership roles in many organizations – Chair, Resources for Future Generations 2018; Chair, Genome BC; Past-President Society of Economic Geologists; Co-Founder and Chair, Geoscience BC; Co-Founder and Chair,

Canada Mining Innovation Council; and member of two councils for the World Economic Forum. He is on the Boards of exploration and technology companies, and participates in advisory groups for clean technology and sustainability.



**Public lecture title: Resources in a world of change and uncertainty.**

**Abstract:** Attempting to understand the future is challenging, particularly for the management of natural resources. Climate change, the energy transition, new technologies, national-global politics, and societal expectations are all changing with unpredictable and volatile implications for resources – e.g., demand, prices, supply chains, access, permitting, community opposition. It can take 10-30 years to find, evaluate, permit and build a new mine and therefore all involved in this process (companies, governments, NGOs, customers and communities) need to have long term perspectives.

Predictions or forecasts for the future are typically based on current trends – extrapolating on-going change. Clearly, this approach is unreliable. If we go back 30 years, very few of the major changes that we see now were accurately predicted. The alternative is look at a range of scenarios for a future state 25-30 years from now. Scenarios provide a way to plan for a range of outcomes, and a means to backcast – to design ways to start moving now towards desirable elements while building strategies to mitigate the most undesirable.

Three very different scenarios will be described. All are unlikely but they are designed to provoke questions and discussion:

1. Follow the trends – progressive improvement based on business as usual
2. The end of mining – a disaster movie with a glimmer of hope
3. A new idealistic business – a holistic view of materials in a circular economy

**Prof Frances Wall, University of Exeter, UK**



Frances Wall is a Professor of Applied Mineralogy, University of Exeter, UK. Her research interests include: Creating a circular economy for technology metals, including critical raw materials; Formation of ore deposits, including rare earths, niobium, tantalum and phosphate deposits; Carbonatites and alkaline rocks: fundamental controls on their petrogenesis, including mantle metasomatism, and rapidly erupted extrusive carbonatites; Responsible mining including ethical sourcing of metals, public perception of mining and energy issues in mining; Regional development of georesources in Cornwall and SW England.

**Public lecture title: A view from the front of the circular economy.**

**Abstract:** When people say 'Circular Economy', the term is often taken to mean 'recycling' and, indeed, there are many companies working on innovative ways to collect and recycle end of life waste. But the circular economy is much more than end-of-life materials; it starts at the beginning. I would like to

talk to you about the 'view from the front', the initial production of metals and minerals and how circular economy principles can inform extraction as well as ensure good stewardship of materials. Circular economy thinking can start from the very first steps of exploration of a resource. Are there different types of ore deposit, or new technologies that could design out waste and pollution? Once in the exploration stages, it is important to consider the whole resource, with its potential by- and co-products not just the main metals of interest. Applying techniques such as life cycle assessment at the design stages of a mine can help optimise the configuration to minimise negative environmental impacts. This approach leads to two views of the sustainability of metals extraction. The first is the one usually considered in mining, and relates to creating sustainable development for the stakeholders related to a mine site. The minerals in the ground are exchanged for increases in human and infrastructure capital. The second relates to the metals themselves, which are inherently super sustainable materials that can last for ever if there is good materials stewardship right from the beginning and then on into value chain for their the use and potentially infinite re-use.

### **Bunting Kayode Williams - Fourah Bay College, Sierra Leone**

Bunting is a geologist and environmental management professional with over 15 years of field experience in the mineral exploration/mining industry. He has served in various roles, including as senior geologist, health, safety and environment officer, exploration manager, and country liaison manager for Nimini Mining Limited in Sierra Leone; geology manager for Jindal Steel Africa in Mauritania and Liberia; and senior project lead geologist for Core Mining Limited in the Republic of Congo.

He is currently a Lecturer at Fourah Bay College, University of Sierra Leone, and Secretary-General for the Sierra Leone Institution of Geoscientists (SLIG) and actively involved with promoting geoscience practice within Sierra Leone.

As Lead National Consultant (for Geology) in 2019, he was responsible for drafting technical

sections relating to mercury-free processing methods of the National Action Plan for Sierra Leone's Artisanal and Small-scale gold mining sector, whilst also reviewing the entire NAP document, working with UNITAR, EPA-SL, other consultants and stakeholders.

Bunting is the National Project Coordinator for the project titled "Sustainable Development of the Small-scale Gold Mining Sector in Sierra Leone" implemented by the AGC and GIZ under a co-financing agreement between the European Union and the German Development Cooperation, as part of their program "Regional Resource Governance in West Africa".



### **Public lecture title: Artisanal mining: A closer look at its relevance towards sustainable development of rural communities**

**Abstract:** Although artisanal mining is the main source of livelihood for residents, in rural communities especially in developing countries, many consider it to be a menace in terms of its potential to cause adverse health impacts and environmental degradation. The benefits obtained from artisanal mining are often utilized to support basic daily living expenses such as daily feeding, education, and health, including assistance to vulnerable people in these communities; as compared to revenue from small-scale and large-scale operations which are largely repatriated. However, a comparison of the environmental and social performances of small-scale and large-scale mining companies operating within the same geographical



territories shows very low levels of compliance to existing regulations and implementation of measures outlined in regulatory instruments submitted as part of the terms and conditions of their mining operations. As such, there is no justification for policy reviews involving the elimination of artisanal mining activities on the basis of their environmental performance. What measures should we recommend in other to improve the occupational safety and environmental degradation practices associated with artisanal mining? How can formalization of the sector help to enhance the positive social benefits that artisanal mining provides to these rural communities whilst also contributing towards elimination of the worst practices leading to widespread environmental degradation and responsible waste management?



## Organising committee

### Director:



**Dr Geertje Schuitema**, Director of the ReSToRE International Summer School, Funded Investigator at iCRAG and Associate Professor at UCD School of Business. Her research focuses on factors that explain (sustainable) consumer behaviour, including the adoption of new technologies and the public perception of environmental issues and risks.

### Co-organisers:

#### **Dr Maeve Boland**



Maeve is a Geoscience Policy, Communications, and Public Affairs Specialist at iCRAG. She was Director of Geoscience Policy at the American Geosciences Institute from 2013 to 2018 and has extensive experience in both geoscience and policy in Ireland and the U.S. She holds geology degrees from Trinity College Dublin and Colorado School of Mines.

#### **Prof Murray Hitzman (Director of iCRAG)**



Murray W. Hitzman is Director of iCRAG and a Science Foundation Ireland Research Professor. Murray has B.A. degrees in geology and anthropology from Dartmouth College (1976), an M.S. in geology from University of Washington (1978), and a Ph.D. in geology from Stanford University (1983). He worked in the petroleum and minerals industries from 1976 to 1993 primarily doing mineral exploration worldwide. Dr. Hitzman served in Washington, D.C. as a policy analyst in the U.S. Senate and the White House Office of Science and Technology Policy (1994-96). In 1996, he was named the Fogarty Professor in Economic Geology at the Colorado School of Mines (CSM) and served as head of the Department of Geology and Geological Engineering from 2002-07. His research in economic geology at CSM was focused on the Central African Copperbelt. In 2016 he joined the U.S. Geological Survey as the Associate Director for Energy and Minerals. In 2018, he was appointed SFI Research Professor in the School of Earth Sciences and Director of iCRAG, based at University College Dublin.

## **Edmund Nickless, Chair, International Union of Geological Sciences Resourcing Future Generation initiative**



Edmund is a geologist by training and has worked extensively on assessment of industrial mineral resources. From 1997 until his retirement in September 2015 he was Executive Secretary of The Geological Society of London. Previous to that, he held senior posts within the British Geological Survey, the then Science and Technology Secretariat of the Cabinet Office where he was environmental adviser, and the Natural Environment Research Council where he was responsible for research grants, training awards and UK participation in international programmes, principally the Ocean Drilling Program and its successors. Since 2013, he

has chaired a group on behalf of IUGS promoting a new initiative, Resourcing Future Generations. He is a Fellow of the Geological Society of London, a Fellow of the Geological Society of America, a Chartered Scientist, Chartered Geologist and European Geologist.

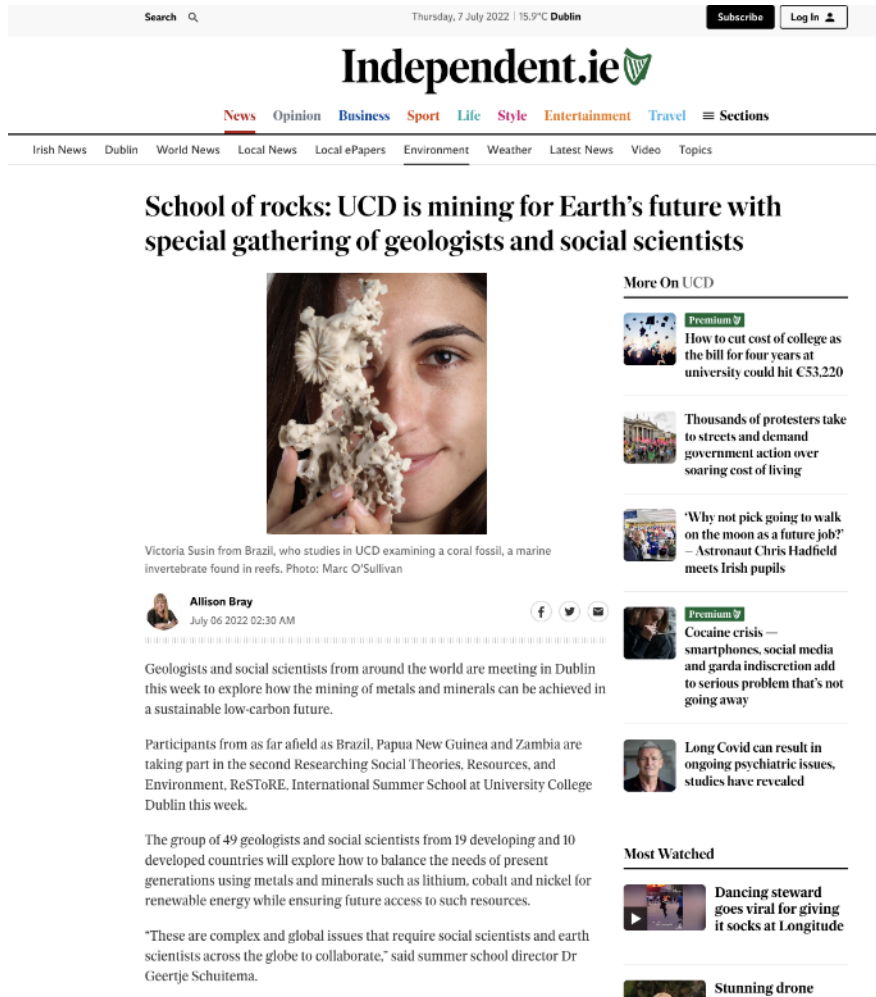
## **Dr Fergus McAuliffe (iCRAG)**



Fergus manages iCRAG's communications, education and public engagement activities. He holds a PhD in environmental science from University College Cork. Alongside his research experience, Fergus also has a wide range of experience in science communication, through winning FameLab International in 2013, delivering workshops and conference talks on science communication around Europe, and is currently a presenter on "The Science Squad/10 Things to Know About" on RTE1 television. As part of his role, Fergus works closely with the Geoscience in Society challenge area in iCRAG.

## Press coverage

- On 6th July, the *Irish Independent* newspaper covered the ReSToRE Summer School, including a photo of participant Victoria Susin.



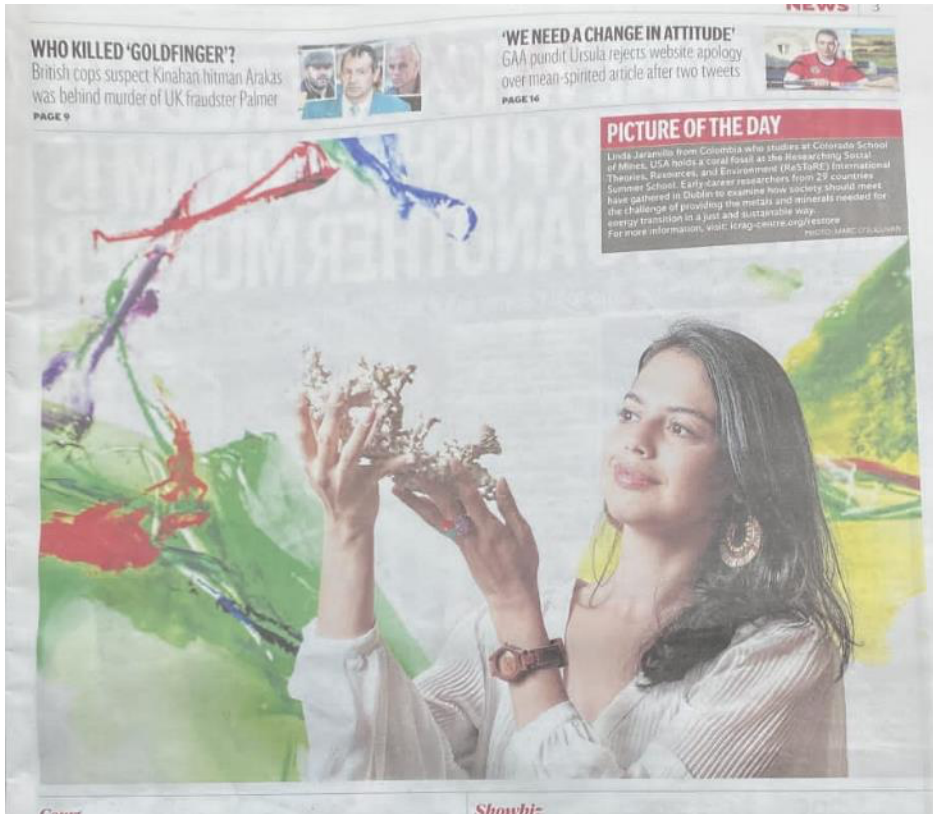
The screenshot shows the homepage of the Irish Independent newspaper. At the top, there is a search bar, the date 'Thursday, 7 July 2022', the temperature '15.9°C Dublin', and buttons for 'Subscribe' and 'Log In'. The main navigation bar includes 'Independent.ie' with a harp logo, and categories like 'News', 'Opinion', 'Business', 'Sport', 'Life', 'Style', 'Entertainment', and 'Travel'. Below this is a secondary navigation bar with 'Irish News', 'Dublin', 'World News', 'Local News', 'Local ePapers', 'Environment', 'Weather', 'Latest News', 'Video', and 'Topics'.

The main article is titled 'School of rocks: UCD is mining for Earth's future with special gathering of geologists and social scientists'. It features a photo of Victoria Susin holding a coral fossil. The byline is 'Allison Bray' dated 'July 06 2022 02:30 AM'. The article text discusses the summer school at UCD, mentioning participants from Brazil, Papua New Guinea, and Zambia, and the focus on sustainable mining of metals and minerals. A quote from summer school director Dr Geertje Schuitema is also included.

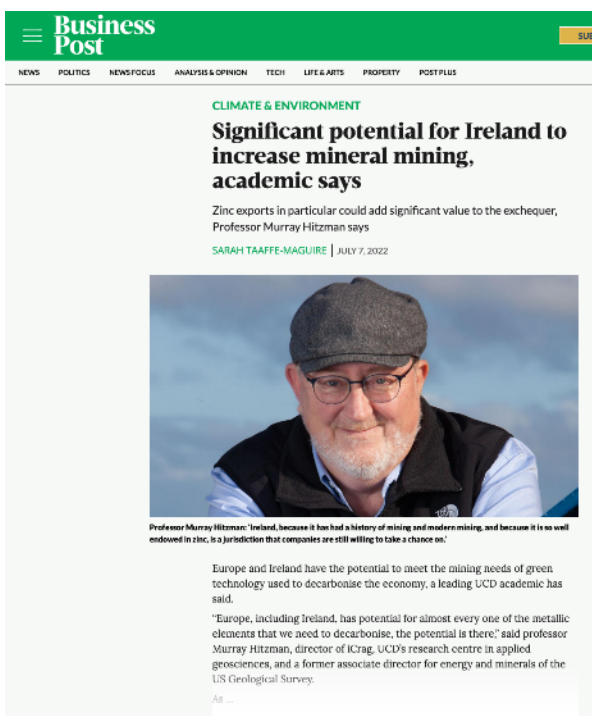
On the right side, there is a 'More On UCD' section with several article teasers: 'How to cut cost of college as the bill for four years at university could hit €53,220', 'Thousands of protesters take to streets and demand government action over soaring cost of living', 'Why not pick going to walk on the moon as a future job? - Astronaut Chris Hadfield meets Irish pupils', 'Cocaine crisis - smartphones, social media and garda indiscretion add to serious problem that's not going away', and 'Long Covid can result in ongoing psychiatric issues, studies have revealed'. Below this is a 'Most Watched' section with video teasers for 'Dancing steward goes viral for giving it socks at Longitude' and 'Stunning drone'.

Link to article: <https://www.independent.ie/news/environment/school-of-rocks-ucd-is-mining-for-earths-future-with-special-gathering-of-geologists-and-social-scientists-41817217.html>

- On 6th July, the *Irish Herald* also covered the event in print, featuring a photo of Linda Urrego, Summer School participant:



- On 7th July, the Irish *Business Post* featured an interview with iCRAG Director and ReSToRE co-organiser Prof Murray Hitzman.



Link to article: <https://www.businesspost.ie/news/significant-potential-for-ireland-to-increase-mineral-mining-academic-says/>



- On 13th July, an interview with participant Dr Aileen Doran was published in the *Enniscorthy Guardian*:

News

Premium 

## Wexford geologist Dr Aileen Doran on the green transition – ‘I want to be part of the solution’



Aileen Doran from Enniscorthy, Co. Wexford holding an ammonite, a shell of a sea animal that lived 165 million years ago during the Jurassic period. Pic: Marc O'Sullivan

Link to article: <https://www.independent.ie/regionals/wexford/news/wexford-geologist-dr-aileen-doran-on-the-green-transition-i-want-to-be-part-of-the-solution-41835125.html>

## ReSToRE Programme

### MONDAY 4th of July

08.00 – 09.00 Registration, coffee and breakfast  
09.00 – 09.30 Welcome and opening  
09.30 – 11.00 Presentation of “workshops”  
11.00 - 12.30 Workshops  
12.30 – 13.15 Lunch  
13.15 – 14.00 Public lecture: Aparajita Banerjee  
14.00 – 15.15 Workshops  
15.15 – 15.30 Coffee  
15.30 – 16.15 Workshops  
16.15 – 17.00 Public lecture: Gavin Mudd  
18.30 – 21.00 Reception and dinner

### TUESDAY 5th of July

08.30 – 09.00 Coffee  
09.00 – 09.45 Public lecture: Nicole Smith  
09.45 – 12.30 Workshops  
12.30 – 13.15 Lunch  
13.15 – 14.00 Public lecture: Frances Wall  
14.00 – 15.15 Workshops  
15.15 – 15.30 Coffee  
15.30 – 17.00 Workshops

### WEDNESDAY 6st of July

08.30 – 09.00 Coffee  
09.00 – 09.45 Public lecture: Adam Simon  
09.45 – 12.00 Workshops  
12.00 – 12.30 Lunch  
12.30 – 13.15 Public lecture: Judy Muthuri  
13.30 – 20.30 Field trip to Howth + dinner

### THURSDAY 7th of July

08.30 – 09.00 Coffee  
09.00 – 09.45 Public lecture: Jyoti Ahuja  
09.45 – 10.30 Public lecture: Bunting Williams  
10.30 – 12.30 Workshops  
12.30 – 13.15 Lunch  
13.15 – 14.00 Public lecture: Wouter Poortinga  
14.00 – 15.15 Workshops  
15.15 – 15.30 Coffee  
15.30 – 17.00 Workshops

### FRIDAY 8th of July

08.30 – 09.00 Coffee  
09.00 – 09.45 Public lecture: John Thompson  
09.45 – 12.30 Workshops  
12.30 – 13.00 Lunch  
13.00 – 14.00 Workshops  
14.00 – 14.30 Coffee  
14.30 – 16.00 Presentation workshops results  
16.00 – 17.30 Reception  
17.30 – 21.00 Barbeque on campus