

LESSONS FROM
WOMEN
**IN ENVIRONMENTAL
SCIENCES (WiES)**

**THE WiES
TOOLKIT**



The Women in Environmental Sciences (WiES) network is an inclusive cross-disciplinary network for women working in ecology and environmental science, based at the University of Manchester, UK.

WiES held its first workshop in June 2018 and learning outcomes from the first workshop were applied to a follow-up workshop in 2019. This booklet demonstrates the importance of women's knowledge and involvement in addressing environmental challenges and the aims of the United Nation's Sustainable Development Goals (SDGs). It highlights the systemic inequalities that currently limit women's full participation in environmental challenges and shows how women are disproportionately impacted by environmental degradation, climate change, and hazard.

The WiES network and events have created a forum for women to come together to promote their roles in environmental sciences through presentations from female experts and knowledge exchange sessions. This booklet presents summaries of both the 2018 and 2019 events and offers a toolkit for creating more events and opportunities to empower women to take up opportunities in environmental sciences.



01 INTRODUCTION

About

Women in Environmental Sciences (WiES) is a network of academics, professionals, and students from a diverse range of backgrounds whose work and interests cover a range of disciplines including environmental sciences, ecology, engineering, social sciences, and the arts as they relate to environmental sustainability. It was launched in June with an award from the University of Manchester's Office of Social Responsibility. The network aims to encourage, support, and empower women working in environmental science by:

- Creating a platform and a social space to ensure that regular and effective engagement about women and environmental issues takes place.
- Developing the institutional support needed to help empower women at all levels to cope with the problems of equality, health, poverty, and food insecurity; and other challenges of climate change such as water and air quality impacts.
- Promoting and encouraging access to lifelong learning for women who are returning to education.
- Encouraging knowledge sharing and promoting opportunities for mentoring to initiate a new generation of informed environmental science advocates, activists, and practitioners.

Challenges facing women in STEM

Throughout history, women have faced challenges of gender discrimination arising from cultural/religious barriers, childbirth and childcare, and inequality in pay. Over the past three decades, there has been some progress in women's empowerment in politics and education, including an increase in women's participation in higher education, especially in the humanities and social sciences. However, in STEM (Science, Technology, Engineering and Mathematics) fields, more systemic change is needed.

Women have crucial roles to play in the necessary transformations to the way

we live, if human beings are to survive climate change. The challenges facing the environment, for land, air, and water, require women to take stronger initiatives in the future to create a sustainable world. Women, most especially in deprived and rural communities in less economically developed nations, feel the impact of environmental damage and pollution. Therefore, the role of women in environmental sciences is crucial at local, regional, national, and international levels. Women's empowerment is needed in family units, urban and rural communities, education systems, and industry and regulatory institutions.

Gender equality and Sustainable Development Goals (SDGs)

The WiES network is a vehicle created to foster and support new groups of women interested in environmental sciences and to promote activities in their local communities related to the United Nations' Sustainable Development Goals (SDGs). Through collective interaction and the sharing of ideas, the WiES network appeals for changes in policies to mitigate the impact of environmental change and degradation on women's lives throughout the world.

WiES held two events (in 2018 and 2019) guided by the 17 SDGs. The SDGs can be broadly summarised as aspirations to ensure that 'no one is left behind' by the serious consequences which will follow global warming. To achieve this,

the objectives of the SDGs should be integrated, inclusive, and applied across the planet. This is currently difficult to achieve. The initial research for these goals as it pertains to women was carried out in only four countries: Pakistan, Colombia, Nigeria, and the United States. According to the UN female researchers themselves, this is largely because of the difficulty of collecting accurate data, especially from some of the world's poorer countries. This makes the drive for a fairer, more equitable distribution of resources ever more urgent as the less economically developed countries of the Global South have the lowest carbon footprints but will suffer the greatest consequences of climate destruction.

Relevance

The WiES events aimed to provide a platform where women with diverse experiential and disciplinary backgrounds could participate co-operatively in engaging discussions and networking. WiES is a platform created to raise the bar for women's participation and, through the meetings, complex environmental issues were discussed openly and safely to provide a basis for pursuing policy changes.

The vision was to provide a network of female environmentalists and researchers empowered to make choices and decisions within their own organisations and communities. The WiES network aligns with the public engagement agenda of UK Research and Innovation (UKRI) and forms part of the investment in 'Engaging Environments' by the UK's

Natural Environment Research Council (NERC). The events enabled women, to freely and confidently share knowledge, skills, passion, and experience in a context where they would not feel the pressure of competition with one another.

The events were also linked with the aim of the host university, the University of Manchester, to widen participation, inclusiveness, and communication for and with people from diverse backgrounds. The target audience included academics, early career researchers, postgraduate students, and members of the public with a general interest in the environment. The key learning outcomes were generated from invited speaker presentations, knowledge exchange sessions, and participant reflections on the events.

This booklet presents the key messages from the events to provide resources for anyone working with women, the environmental sciences, and their communities. It offers a toolkit for developing more effective participation strategies that are inclusive, collective, and progressive, in all spheres of life, to create a sustainable future for all.

I would like to thank all those involved and contributed to the WiES and made it a success so far and look forward to building up more opportunities for engaging women in the environmental sciences.



*Dr Cecilia Medupin
Convener, WiES, University of
Manchester, UK*

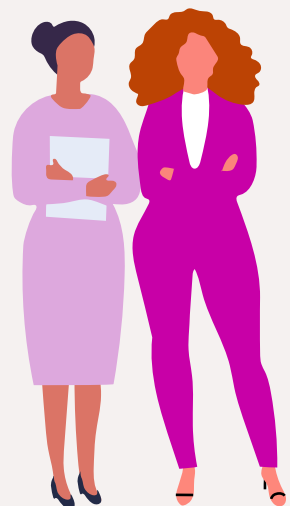


02 THE WIES EVENTS

The WiES events aimed to:

- Bring together women with diverse ethnicity and disciplinary backgrounds to promote inclusiveness, widen participation, and foster discussion.
- Understand the position and potential role of women in the environmental sciences, including academic, policy, and professional spheres.
- Reflect the interdisciplinary nature of the environmental sciences through the selection of speakers.
- Provide an empowering and informal atmosphere to motivate participants and facilitate networking.

Each event began with a welcome and introduction from the WiES network convener. The morning was dedicated to presentations by female presenters, who spoke on different environmental themes related to the SDGs. In 2018 these included energy, leadership and women's empowerment, scientific research, policy, and the delivery of impact; in 2019 they covered the themes of zero poverty, zero hunger, health and wellbeing, education, decent work and economic growth, reduced inequalities for sustainable cities, and climate change. There were opportunities for questions and answers after each presentation. The themes for the 2019 presentations were based on feedback from the 2018 event.



"The breakout session was a great opportunity to interact and give voice to opinion on key issues."

"The atmosphere was inclusive."

Lunch and time for networking followed the morning session before knowledge exchange breakout sessions in the afternoon. Each breakout session expanded on the role of women as it pertained to the earlier presentations as well as other environmental themes. These included environmental changes and health, water, society, and communication (2018); and the role of women in rebuilding ecological communities, environmental changes and health, society and communication, citizen science, and women in industry (2019).

Each breakout session had a facilitator, and the small groups gave participants the opportunity to interact, engage more deeply in the topics covered in the morning presentations, and delve into other matters that related to the workshop theme. Participants and facilitators each shared their experiences, asked questions, and made contributions to the discussions. Based on feedback from the 2018 event, the 2019 breakout sessions were longer to give more time for knowledge exchange.

Evaluation was conducted for each event as an important element of learning from the format, structure, and themes.



"It has been good to see and hear from many professional women in this sector."

"The talks by the women were really inspiring and enthusiastic."

Leadership and gender equality

Inclusiveness is one of the bed rocks to effective leadership. People and groups from diverse backgrounds, including volunteers, play critical roles in the implementation of environmental strategies. For this reason volunteers and citizen scientists should be treated with respect. Effective leadership is also about helping individuals to achieve their individual goals and gain fulfilling careers. Organisations should have flexible working policies to recognise women's caring responsibilities, and women should be empowered to make choices and establish an appropriate work-life balance.

Dr Tayo Adebowale, Cirkadia, UK.

"In order to meet the zero-carbon challenge and many other environmental challenges, we need people from a wide range of disciplines working together, all with a core understanding of the possible impacts of their disciplines on the environment."

Policy and Research

Policy-relevant research has positive implications for society. For academics looking to engage in policy-related research, support from line management is extremely important. The effectiveness of carrying out research with impact involves proactive engagement mechanisms such as stakeholder interviews, industry and policy workshops, written and oral communication.

The more women we have playing their roles in shaping policy through science and engineering, the more policies will reflect the true diversity of society.



*Professor Alice Larkin,
University of Manchester, UK*

Education

Citizen science refers to projects that engage non-scientists in data collection and/or analysis. Thousands of citizen science initiatives have sprung up in recent years and these bring a wide range of benefits, including access to more/different data, collaboration between stakeholders and communities, and combining different forms of knowledge.

Citizen science provides an alternative route into involvement with scientific research. This can be particularly valuable for groups and communities that are underrepresented at university.

"Citizen science projects can be a first step to engaging with scientific topics and techniques."



*Dr Toos van Noordwijk, Earthwatch Europe
Image Credit: Toos van Noordwijk*

In addition, it provides opportunities for non-scientists to conduct research that is relevant to them and may not be on the agenda of major academic institutions. Citizen science can thus contribute to the democratisation of science.

Health

"It is important to acknowledge that women and children are the most vulnerable to climate change effects."

They can be more susceptible to disease, especially young children and pregnant women, and women frequently bear the burden of providing food, water, and care for the family. This challenge increases if climate change impacts on the availability of food and water, which can further exacerbate other negative effects on health. These effects are felt first and most harshly by the already disadvantaged.

We need to increase awareness and promote effective communication to diverse groups in ways that are inclusive. Diverse methods of engaging with the widespread community include children's education and effective advertisement of public engagement activities to encourage participation from communities.

Climate change is a bigger, more complex issue, but also one with more scope for local, grassroots initiatives that can have an impact now, in the communities where they occur.



Professor Ann Webb,
The University of Manchester, UK
Image Credit: Ann Webb



Agriculture and community engagement

Natural disasters can have implications for the food security, health, stability, safety, and security of individuals and communities. Learning to pool people's skills collectively builds the capacity to rebuild communities through socio-ecological interactions. Socio-ecological interactions are rooted in local cultures, identities, traditions, innovation, and knowledge. They support people and communities in maintaining their spiritual and material relationships with the land and environment. Academic researchers can contribute to rebuilding communities and help to bridge the gap to vulnerable and low-income groups.

Self-help methods are generally more effective than those led by non-governmental organisations

(NGOs) as they are more useful and empowering to the local communities. For example, the Chikukwa communities in Zimbabwe recovered from hurricane by re-building their villages through collective responsibility. The women in the community supported each other, they were able to conveniently feed their children and pay their children's school fees.



Dr Georgina McAllister, Centre for Agroecology, Water and Resilience, Coventry University, UK;
Programme Director, GardenAfrica.
Image Credit: Georgina McAllister

"The idea that one's wealth is increased by one's neighbours' wealth promotes equal welfare for all."

Energy



Professor Cathy Hollis, Department of Earth and Environmental Sciences, School of Natural Sciences, The University of Manchester, UK

Women are reliant on domestic energy and are potential agents of change due to their domestic responsibilities, citizen purchasing power, and professional contributions. The future of the hydrocarbon industry should focus more on the optimisation of existing resources. Through greater gender equality and cultural diversity, the impact of women will be felt in national oil companies. The future of a mixed-energy economy suggests that clean energy requires geo-technical and sub-surface engineers, including women. Therefore, to sustain the needs of the energy sector, there is a critical need for female scientists and engineers.

"In the coming decades, female technical leadership, and parity of pay and progression with men is essential if we are to manage the energy transition needed to address the most important global challenge that the Earth's population has faced."

Sustainable cities



Professor Sarah Lindley, Department of Geography, School of Environment, Education and Development, The University of Manchester, UK.
Image Credit: Sarah Lindley

Green infrastructure not only reduces heat, noise, and air pollution; it also influences our social welfare in terms of human behaviour and mood.

The future of urban areas can be sustained through the implementation of practices that promote a greener future. This practice could include interaction with affected communities in the planning, process, and development of urban areas. Green spaces in urban areas provide opportunities for social interaction, peace, exhilaration, and surprise, enhancing the health, independence, and wellbeing of all groups, including ageing members of the community. The voices and contribution of members of local communities, including women, are necessary during the planning and development of urban areas.



03 WHAT IS DISTINCTIVE ABOUT WiES?

WiES draws on diverse experiences, backgrounds, disciplines, and approaches that could be applied to research and engagement in environmental sciences. The diverse presentations and knowledge exchange sessions in the 2018 and 2019 events brought together people from the grassroots, academia, industry, policy making, students, and members of the public with an interest in environmental sciences. The events promoted inclusiveness to widen participation in environmental topics.

The events provided spaces to motivate, encourage, and inspire a new generation of women to become environmental science advocates, activists, and practitioners. It also created opportunities to meet new people and develop new networks, which are key to enhancing women's professional opportunities. The events promoted female confidence

and effective engagement with the environmental challenges the world faces, alongside the scientific strategies that might overcome these challenges.

The meeting opened up opportunities for effective discussions, providing new learning for both academics and non-academics at different career stages. It provided an avenue to explore new terrains of research especially as they pertain to women of diverse cares and communities, focusing on meeting needs through applied research and engagement.

The wider agenda of the WiES network is linked with the general higher education agenda (including the University of Manchester's) to widen participation, inclusiveness and communication with people from diverse groups. This concept of environmental sustainability itself aligns with the United Nations' Sustainable Development Goals (SDGs).



“Women have crucial roles to play in the necessary transformations in the way we live, if human beings are to survive climate change.”



05 THE WIES TOOLKIT

The WiES toolkit is based on experiences from the 2018 and 2019 events and wider network. It brings together key learning outcomes so that others can draw and build on them in advancing the importance and role of women in environmental sciences.

Bringing women together

- More open and safe avenues are needed in which women can come together to build networks and communities and be inspired about common issues.
- Events can provide a chance for women to listen to presentations, voice their opinions, share experience, and listen to the challenges faced by others while being motivated and enthused by experienced female leaders.
- Quality engagement takes time to design, build, establish, and evaluate. The same goes for forming project teams and building capacity. This should be planned for from the start.
- Events should provide plenty of time for discussion and knowledge sharing.
- It is important to promote information sharing to ensure that events reach diverse groups and networks.
- Communication is key to equal participation so researchers must use accessible, respectful language and listen to feedback from communities.
- Partnerships and networks facilitate research, communication, and career progression.

Understanding the position and potential role of women in environmental sciences

- A step change is needed to break gendered stereotypes and organisations should rethink priorities to better value diversity.
- Inclusiveness and widening participation are important values for sustainable leadership/followership in any organisation.
- Women should be empowered to make choices in their careers and about their work-life balance.
- Trust and respect are important for building relationships between researchers, practitioners, and the public.
- Environmental topics can create opportunities for communal identity, tolerance, inclusivity, and collectiveness.
- Environmental research and the importance of gender equality can be disseminated through education, beginning with children.


Reflecting the interdisciplinary nature of the environmental sciences

- Environmental sciences have many different facets and are interdisciplinary in nature.
- Environmental research should relate to the context on the ground and have a sustainable aspect to it, providing self-help solutions to everyday problems to engage communities.
- The SDGs offer a framework to structure engagement on key challenges facing society, especially around the environment and gender equality.
- Ecoproofing and effective engagement are key elements for conducting research with impact.
- Women and girls need to be part of the solution not least because they are disproportionately affected by environmental disasters, conditions, challenges, and transitions.

We can all do more – what could you do?

Providing an empowering and informal atmosphere

- Women should be encouraged and empowered to speak up to create organisational change. In turn, women should promote effective communication towards the change they would like to see.
- Diverse workforces are better workforces and can be built through open and effective recruitment, leadership, and equal opportunities.
- Women should be encouraged to participate more in STEM recruitment fairs to encourage others.
- Citizen science approaches should be considered for environmental research, as it empowers society, enhances participation, and inspires action.
- Community interaction and involvement should be central to research planning.
- Conducting local, grassroots research and community outreach are appropriate routes to create national and international impacts.



This is an open access paper under the terms and conditions of the Creative Commons Attribution (CC BY) license (<http://creativecommons.org/licenses/by/4.0/>).

Unless stated otherwise via an image credit, all photographs within this document are taken and supplied with consent by Andy Tomsa.

Author Contributions: The topic was conceptualised, written and interpreted by Dr Cecilia Medupin, Department of Earth and Environmental Sciences, School of Natural Sciences, The University of Manchester, Manchester, M13 9PL, UK; cecilia.medupin@manchester.ac.uk

The author has read and agreed to the published version of the manuscript.

Funding: The project was funded by an award received from the University of Manchester, Faculty of Science. The project also received funds from the NERC-funded project Engaging Environments for evaluation and the production of this report.

Acknowledgements: All the Women in Environmental Sciences and special thanks to: Ann Webb, Alice Larkin, Olutayo Adebawale, Cathy Hollis, Emma Gardner, Claire Brown, George McAllister, Sarah Lindley, Rosalind Bark, Toos van Noordwijk, Kat McGavin, Katherine Joy, Sue Pascoe, Danielle Hinchliffe, Cindy Regalado, for their meaningful support and contributions. The views expressed in this document are personal and those expressed by contributors/participants of the Women in Environmental Sciences events. The writer acknowledges references and materials from online sources, such as global/regional women's networks, UN bodies and UN Women, and other researchers. She is grateful to them.

With thanks also to Matt Burrows for his co-ordination and editorial contributions, Madeleine Hatfield and Jenny Case at Yellowback Editing & Publishing, and Daisy Tomlinson and Lewis Haywood, students at the Department of Typography & Graphic Communication at University of Reading for the design work.

Conflicts of Interest: The author declares no conflict of interest.

