

### **New Impulses for Austrian Climate Change Adaptation**

#### Final Report Part 2

- **Tederal Ministry** Republic of Austria Agriculture, Regions and Tourism
- LAND OBERÖSTERREICH
- Federal Ministry Republic of Austria Climate Action, Environment, Energy, Mobility, Innovation and Technology







#### **Contracting Parties**

Austrian Federal Ministry of Education, Science and Research

Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology

Klima- und Energiefonds

Federal Province of Upper Austria

#### Administrative project coordination

Federal Environment Agency

#### **Project leader**

Herbert Formayer

Institute of Meteorology and Climatology

Department of Water – Atmosphere – Environment

University of Natural Resources and Life Sciences, Vienna (BOKU)

Gregor Mendel Straße 33, 1190 Vienna

URL: http://www.startclim.at/

#### **Editors**

Herbert Formayer, Nikolaus Becsi

Institute of Meteorology and Climatology

Department of Water – Atmosphere – Environment

University of Natural Resources and Life Sciences, Vienna (BOKU)

Vienna, January 2021

Print, February 2021

#### Contributions to StartClim2019

#### StartClim2019.C: JuKli - Young climate

#### How can young people be motivated for climate change in crowded cities?

Universität für Bodenkultur Wien Department für Raum, Landschaft und Infrastruktur Institut für Landschaftsarchitektur (ILA): DI Dr. Roland Tusch, DI Jürgen Furchtlehner, DI Daniela Lehner, Univ. Prof. DI Lilli Lička

GB\* Stadtteilbüro für die Bezirke 16, 17, 18, 19 (GB\*): Arch. DI Florian Brand, DI Barbara Mayer, Seda Uydas BSc, Felix Draesner BA

#### StartClim2019.D: Raising planners' awareness of the climate-fit city

Weatherpark GmbH – Meteorologische Forschung und Dienstleistungen: Matthias Ratheiser AIT Austrian Institute of Technology GmbH: Kathrin Röderer

### StartClim2019.F: C~ART Climate and art – touching and being touched by art interventions in the context of climate change

Paris-Lodron Universität Salzburg, Interfakultärer Fachbereich für Geoinformatik: Mag. Dr. Stefan Kienberger

Science Visualization Lab Angewandte: Martina Fröschl, MSc Angewandte Innovation Lab: Mag. art. Felipe Wagner dos Santos

#### StartClim2019.H: "Gucci institute, that! - Paul and Linda on a private quest" - A ClimaToon for Kids

Umweltbundesamt GmbH: Ivo Offenthaler, Sonja Völler, Natalie C. Sandner

#### Scientific Lead and coordination

Institute of Meteorology and Climatology

Department of Water - Atmosphere - Environment

BOKU – University of Natural Resources and Life Sciences, Vienna

Assoc. Prof. Dr. Herbert Formayer, Nikolaus Becsi

#### Scientific board

Dr. Jill Jäger, Independent Scholar

Prof. Dr. Hartmut Graßl, Max Planck Institute for Meteorology, University of Hamburg

Dr. Roland Hohmann, Federal Office for the Environment FOEN, Switzerland

Prof. Dr. Helga Kromp-Kolb, University of Natural Resources and Life Sciences

#### **Coordinating group**

Austrian Federal Ministry of Education, Science and Research

Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology

Klima- und Energiefonds

Federal State of Upper Austria

#### Administrative project coordination

Umweltbundesamt

Maria Balas

Eva Margelik

#### Table of contents

Contributions to StartClim2019	3
Table of contents	5
Abstract	7
The StartClim research programme	10
StartClim2019.C: JuKli – Young climate How can young people be motivated for climate change crowded cities?	
StartClim2019.D: Raising planners' awareness of the climate-fit city	13
StartClim2019.F: C~ART Climate and art – touching and being touched by art interventions in t context of climate change	
StartClim2019.H: "Gucci institute, that! – Paul and Linda on a private quest." – A ClimaToon for kids	
Imprint	20

#### **Abstract**

StartClim has been studying adaptation to climate change since 2008. The projects in StartClim2019 addressed various research questions in connection with land use and conflicts of use in climate change, climate change and communication, climate change and art, and educational research on climate change.

#### JuKli - Young climate

#### How can young people be motivated for climate change in the crowded city?

The project investigated how the relevance of climate change can be reinforced among young people. Although many young people recognize the importance of the topic (e.g. Fridays for Future movement), it is difficult for them to relate it to their own living environment and to act in a climate-friendly way. In order to reduce this contradiction between problem awareness and climate-friendly action, scientific studies recommend the targeted linking of the topic to everyday needs and to the local environment. This is where "Young Climate" came in. The young people involved in the project were pupils of the KOPP 2 secondary school in the 16th district of Vienna, Ottakring. The Ottakring neighbourhood is one of the most densely populated districts. The lack of green spaces makes the effects of global warming particularly noticeable there. In cooperation with the pupils, teachers and a team of the local Urban Renewal Office, researchers from the Institute of Landscape Architecture at the University of Natural Resources and Life Sciences, Vienna, examined approaches for raising awareness and reinforcing the willingness of young people to take action. Approaches to awareness-raising and behaviour were addressed in various workshops. Through specific learning methods a connection to the personal living environment was established. Excursions sharpened and expanded the pupils' knowledge and awareness of climate change. The joint visit to a newly designed pedestrian-friendly street with tree plantings and a park near the school illustrated how mobility behaviour, building materials or vegetation can be used in open space design to counteract climate change. Subsequently, the pupils were encouraged to think of action goals for their behaviour at home, at school and in urban space. Applying the complex topic of climate change to the personal, local living environment appears to be a promising way of bringing climate change closer to young people. This confirmed the recommendations of previous studies.

#### Raising planners' awareness of the climate-fit city

Adaptation to climate change in the field of urban planning is essential. Planners who design buildings and open spaces are key players when it comes to quality of life in cities because their design often lasts for decades. Thus, the main goal of the project was to create basic tools for raising planners' awareness of climate change. Only if they are sensitive to the challenges and tasks in this field will they be able to create buildings and open space that are adapted to climate change and contribute to a better quality of life for the inhabitants of our cities.

The main project goal was to develop communication strategies tailored to the target audience. We wanted to give planners reasons for creating heat-adapted cities as places where people enjoy living. Planners were to be provided with specific how-to instructions, which we formulated together with an environmental psychologist using persuasive strategies.

The primary approach of finding a collective vision of a future adapted to climate change was defined after two stakeholder workshops with planners. A vision painting a lively and positive picture of a future with resilient, sustainable cities designed for its inhabitants simply does not exist. So, we had to show what this picture looks like and find out how to communicate it effectively as a model.

As a main outcome of the project, twelve characteristics of a collective vision were formulated. We discovered that visions like this have to be formulated for different subsectors of the wide field of planning: city planning, building design, planning of infrastructure, hydraulic construction, etc. We hope that the project results will inspire the stakeholders of the various sectors to define their own specific vision and to apply the characteristics formulated in the project. Institutions that need to develop visions as described above are:

- Professional bodies: chamber of architecture, chamber of civil engineers
- Planning departments in cities with long-term, strategic focus: e.g. MA18 in Vienna
- Supporting institutions may be:
  - Private initiatives such as KlimaKonkret Making our communities and cities climate-fit
  - Involved NGOs: e.g. CCCA
  - Grants from corresponding funds: e.g. Klimafonds

In the end – as an inspiration and an example of how such a vision might look – we developed a vision for climate-sensitive city planning focusing on comfortable conditions for inhabitants during heatwaves.

### C~ART Climate and art – touching and being touched by art interventions in the context of climate change

Transformation and social paradigm shifts are essentially shaped by art and culture. Climate change is not only a challenge for science, but also a cultural phenomenon. The "culture of life" of our society causes climate change. The C~ART project (http://c-art.zgis.at) was dedicated to this connection between science and art - between reason and emotion - with the aim of identifying the starting point and possibilities for increased cooperation of scientists and artists and of developing initial ideas for concrete implementation. C~ART was carried out by the University of Salzburg and the University of Applied Arts Vienna in collaboration with the artist Hermann Josef Hack (www.Hermann-Josef-Hack.de and http://hackpainter.com) as part of the StartClim funding programme and followed the action research approach. A fundamental exploration of the possibilities and expectations of both sides was documented on film with interviews with prominent artists and scientists. Existing art projects with a focus on climate change were collected and inventoried and served as the basis for an extended network for the organization of the KLIMA~TATEN~DRANG workshop, and for future research projects (e.g. ACRP). The workshop looked at forms of interaction between science and art, and initial concrete ideas were developed. C~ART emphasized the importance of creating spaces where art and science can work together freely. It is important to realize that artists cannot be reduced to the role of communicators of scientific content, nor do scientists want to serve the general public as mere invisible results suppliers. The separation of science and art is a result of the industrial age with its requirement for specialization. To develop a vision of a climate-friendly society of tomorrow, it is therefore necessary to revive an interaction between science and art. This can only come about through joint action.

#### "Gucci institute, that! - Paul and Linda on a private quest" - A ClimaToon for Kids

This project inquired into attitudes to knowledge among senior secondary school pupils [last two years of "Oberstufe"]. The results will help in the design of a comic book aimed, against the backdrop of climate change debates, at dispelling the most common misconceptions and knowledge gaps about science – specifically, misconceptions about its function, purpose, capability and limits – thereby laying the foundation for alternative constructions of knowledge.

Core results from almost 100 responses from varying school types were: science (as opposed to humanities) is most strongly associated with research and scholarship, and within science this is most

represented by the "rigorous" disciplines physics and chemistry. Accordingly the (male) physicist dominates the image of an exemplary scientist. Science, in the respondents' view, is primarily interesting, reproducible and trustworthy. After school education, science is held to be the most reliable information source. Trust in published studies primarily depends on the inclusion of legitimate sources and facts – while agreement with own experience and common sense follow second and third. Surprisingly little importance is attributed to social media feedback or friends' opinions. Perceived conflicts between scientific and alternative explanations are resolved for preference through compromise or case-by-case decision – unless science contradicts individual experience or religion (which is the most frequently polarizing element). While science's influence on education and daily life is judged "just right" by the majority, 60 per cent of the respondents find that its influence in politics is insufficient. These central findings partly corroborate the initial storyboard of our comic, although the survey showed that some aspects (mainly female role models and scientific literacy) will need even stronger emphasis.

#### The StartClim research programme

The StartClim climate research programme is a flexible instrument. Because of the short project duration and annual allocation of project topics, it can react quickly to topical aspects of climate and climate change. It is financed by a donor consortium:

- Austrian Federal Ministry of Education, Science and Research
- Austrian Federal Ministry of Climate Action, Environment, Energy, Mobility, Innovation and Technology
- Klima- und Energiefonds
- Federal Province of Upper Austria

StartClim has been studying adaptation to climate change since 2008. Since StartClim2012, the programme's aim has been to deliver scientific contributions to the implementation of the Austrian National Adaptation Strategy.

The StartClim2019 projects examined different aspects of relevance to climate change adaptation in Austria. The topics explored were:

- Climate-friendly behaviour in students
- Climate change awareness for city planners
- Climate communication for tourism
- Climate change and art

The StartClim2019 report consists of an overview in German and English of the results, along with separate documentation with detailed descriptions of the individual projects by the respective project teams. All StartClim2019 reports and documents will be available for download on the StartClim website (www.startclim.at). Furthermore, a limited number of folders containing a short summary of the results will also be made available.

# StartClim2019.C: JuKli – Young climate How can young people be motivated for climate change in crowded cities?

Young people in particular are aware of the importance of climate change, not least strengthened by the Fridays for Future movement. Nevertheless, many find it difficult to relate to their own living environment, to actually act in a climate-friendly manner and to get personally involved. To reduce this contradiction between problem awareness and climate-friendly action, scientific studies recommend the targeted linking the topic of climate change to everyday needs and local conditions. Furthermore, it is important to point out possible courses of action that are also within the young people's personal decision-making scope (cf. Wibeck 2013; Kuthe et al. 2018).

The project took up this practice-oriented approach to climate change education. Using different teaching formats and following the method of action research, it investigated whether climate awareness can be increased among pupils and how they can subsequently adapt their behaviour in relation to climate change. The adolescents involved in the project were pupils of the 3<sup>rd</sup> and 4<sup>th</sup> grade of the secondary school KOPP 2 in the 16th district of Vienna, Ottakring. The project focused on young people from different backgrounds. Ottakring was chosen as the project area because it is a densely built-up district. Because of the lack of green spaces, the effects of global warming are particularly noticeable there. In cooperation with the pupils, their teachers and a team of the local Urban Renewal Office, researchers from the Institute of Landscape Architecture at the University of Natural Resources and Life Sciences, Vienna, held a series of workshops to examine various approaches to raising awareness and strengthening the willingness of young people to take action.

Workshops that explore a particular aspect of climate change or offer special experiences can provide a valuable addition to traditional school lessons. The project established a connection to the everyday life of the pupils through the topics of green space supply and mobility in the school environment. The overlapping of the different reflections of the workshops showed that young people could be sensitized to the topic of global warming by using experience-oriented methods. Besides the individual learning settings, the mix of strategies was key, as this enabled the adolescents to take different approaches. After querying the level of knowledge of the participants, the workshops addressed two levels, awareness and behaviour.

- Expanding knowledge: A broad knowledge of climate change among the pupils was noticed already at the beginning of the project. Excursions, such as visits to the research institute Zentralanstalt für Meteorologie und Geodynamik (ZAMG) and the hyper globe of the University of Vienna at the Institute of Geography and Regional Research, expanded this knowledge. Scientists conducting research in the field of climate change acted as reliable facilitators. Even though knowledge was increased, the topic remained largely abstract for the young people. The project was challenged by the pupils' coronainduced insecurities in everyday school life. Upcoming decisions on further education or career choices distracted the pupils.
- Raising awareness: The connection of scientific facts with the pupils' familiar local environment proved to be of particular relevance. An experiment with a simplified city model and an iceberg that slowly melted illustrated the consequences of climate change. The findings could be transferred to the young people's direct living environment. Although the effects of global warming are clearly measurable in densely built-up areas, the pupils stated that they themselves hardly perceived the consequences of climate change. An experience-based approach was implemented by building simple measuring

devices and using them to take measurements. The hands-on experiences initiated learning processes, and an expansion of knowledge was observed. Through experience-based and experiential learning methods, a connection to local conditions and the personal living environment of the pupils was established.

- Changing behaviour: Subsequently, the pupils were asked to develop action goals for home, school and behaviour in the city. The visit to a newly designed pedestrian-friendly street with tree plantings and a park near the school, combined with the explanation of the design office, illustrated on site how knowledge about mobility behaviour, material use and vegetation can be used in open space design to counteract climate change. Afterwards, the pupils used these experiences and their local knowledge to collect ideas on how to tackle climate change in the high-density school environment. Awareness of climate-friendly options for action was recognized. Adolescents are more limited in their freedom of choice and scope for action than adults. Nevertheless, already at this age it is important to create a sense of responsibility and to develop skills that will enable young people to generate solutions and concrete steps for action in the future. The action-oriented workshops, which focused on core topics, contributed to this process. A change in actual behaviour could not be examined at this point.
- Applying the complex topic to the personal and local living environment provides a promising way of bringing climate change closer to the adolescents. This also confirms recommendations of previous studies. Relocating some of the teaching from the classroom to the school environment can be another important step in this process. A stronger link between the topic of global warming and the everyday problems, interests and needs of young people seems to be useful. In order to achieve a change in behaviour, reinforcement of the topic is required. For this purpose, the methods examined in the project proved to be valid components that will gradually complement each other in a long-term process.



**Fig. 1:** Brainstorming of pupils on climate-friendly options for behaviour, carried out in urban open space (Photo: Jürgen Furchtlehner)

# StartClim2019.D: Raising planners' awareness of the climate-fit city

Global climate change – caused and driven by humans – has a great impact on the quality of life and health of people in cities. In addition to climate protection, we must therefore take action to mitigate the effects of climate change.

One of the many levels at which adaptation measures are essential is the planning of the buildings in which we live and work and the urban open spaces in which we move. Certain professional groups – planners, builders and representatives of cities and provinces – have key functions in the design of our living space, because their determinations often remain in place for decades.

The aim of the project was therefore to create targeted material in order to subsequently make as many actors as possible aware of the topic of climate change. Only then will they adapt the planning and implementation of our living space to a changed climate and thus have a positive effect on people's quality of life and health.

The basic idea of this project was to develop methods for reaching out specifically to this one target group with a view to motivating it to act independently in terms of climate change adaptation. The special feature of the project was that specific instructions for action were formulated with the support of an environmental psychologist using persuasive strategies, which aim to change attitudes or behaviour without putting pressure on or manipulating the person.

#### Results: Recipe for successful awareness raising

The starting point for the development of a catalogue of measures was the absence of a shared vision of a climate-friendly future. The project sought to define a vision of successful, sustainable, climate-conscious city and building planning as its content and to identify ways of conveying this vision in order for it to be effective and guide action.

Twelve properties of a shared vision were formulated.

- (1) A vision for climate-sensitive urban planning should have an up-to-date reference and be relevant for all actors involved.
- (2) The vision should have a regional / local or institutional reference, which should be defined as far as possible to address a specific context.
- (3) The vision should communicate a clear message and simple behavioural guidelines.
- (4) The vision should be conveyed as clearly and objectively as possible, with images as a visual aid.
- (5) The absence of knowledge of climate change by some planners and half-formed ideas of adaptation measures are an obstacle to climate-fit planning. The vision should thus contain simple and clear answers to the planners' questions.
- (6) Beside behavioural guidelines, the vision should also contain information about the effectiveness of the desirable behaviour by providing best- and worst-practice examples.
- (7) The vision should show ways of self-commitment: e.g. public declarations of support.
- (8) People should be supported in defining individual, preferably specific, goals, along with reminders and prompts.
- (9) The shared vision should follow current social standards.
- (10) Role models should be carefully chosen to ensure that they are not disliked or even rejected by a majority of the members of the target group.
- (11) Reward is better than punishment as a motivation for desirable behaviour. Rewards should be given promptly and should not be too large.

(12) Social support and appreciation may be seen as an advantage by members of the target group. As a consequence positive "tales of joy" should be used to transport positive emotions.

#### Formulating a vision

A vision like the one outlined here is necessary in many areas of planning: for example, in hydraulic engineering, in building technology or in infrastructure planning. To make it more tangible, a vision for climate-sensitive urban planning was outlined during the project as an example: "Open spaces at a pleasant temperature for the residents of a city of the future". This vision can be found in the long-version of the project report.

#### Next steps: start cooking!

- The absence of specific pictures and ideas about the future is a crucial obstacle on the path to designing and building a city adapted to the impacts of the climate crisis. Therefore we need a shared vision of a climate-friendly future. Climate-sensitive solutions have to be displayed in a positive and clear way, so that pictures start to form in people's minds. Above all, city planners, architects and landscape architects have to be aware of these pictures, of fairly shared public space, of open spaces with connected green spaces attractive to residents. Finally, this vision enables us to set about the necessary transformation of our cities boldly and with enthusiasm. In this way, more and more decision makers and residents will abandon their resistance to change.
- The outcome of this project should encourage follow-up projects and initiatives.
- The results (i.e. the shared vision of pleasant open spaces) should be attractively visualized by means of a brochure or website.
- A shared vison of a climate-fit city has to be developed across all city planning and administration departments. The resistance to this topic may be reduced if the administrative units concerned receive funds for their personal costs. Units or organizations that should work on their visions include:
  - Professional associations of architects, planners, landscape architects, real estate developers
  - Strategic city planning departments
  - Supporting institutions (with funds and know-how), such as:
    - Private initiatives like KlimaKonkret: making our communities climate-fit
    - Associations and NGOS like CCCA
    - Institutions providing funds for climate change measures like Klimafonds
  - Politicians showing leadership. There are often weak or even contrary guidelines and political signals within a community. As a result planners and members of the administration are confused. The pathway to climate-fit cities stays vague and invisible. So it is important that intentions are clearly and visibly represented by the leader of the community and passed down. Follow-up projects should deal with the implementation of a shared vision in the daily work of a city administration. We not only have to teach managers and leaders what to do, we have to convince them and obtain their support for better future planning.

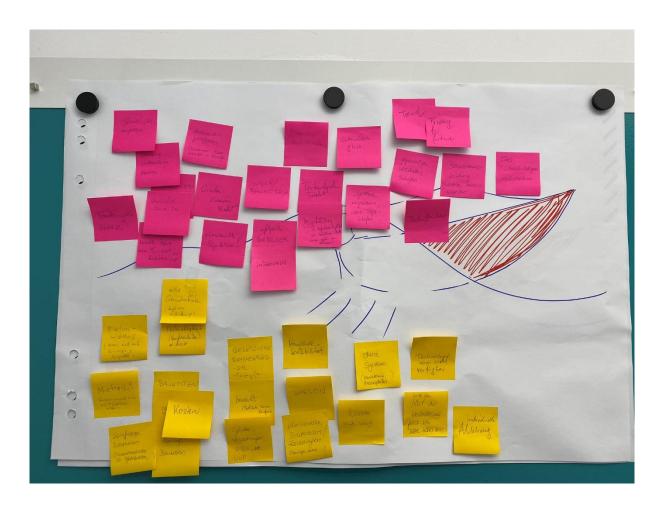


Fig. 2: "Speedboat" brainstorming from the first workshop

# StartClim2019.F: C~ART Climate and art – touching and being touched by art interventions in the context of climate change

Transformation and social paradigm shifts are essentially shaped by art and culture. Climate change is not only a challenge for science but also a cultural phenomenon. The living culture of our society causes climate change. Besides a sound rationale, it is necessary to reach people on another level – to touch them on an emotional level, where moods and feelings are allowed. This is the field of art and culture. The project C~ART (<a href="http://c-art.zgis.at">http://c-art.zgis.at</a>) was dedicated to this connection of science and art – of reason and emotion. Its main goal was to show the starting point and possibilities for intensified cooperation of scientists and artists and to develop initial ideas for specific implementation. C~ART was implemented by the University of Salzburg (Department of Geoinformatics – Z\_GIS) and the University of Applied Arts in Vienna in collaboration with the artist Hermann Josef Hack (<a href="www.Hermann-Josef-Hack.de">www.Hermann-Josef-Hack.de</a> and <a href="http://hackpainter.com">http://hackpainter.com</a>) and his "Aesthetics of Global Survival" as part of the StartClim funding programme and followed the approach of action research.

Concrete goals and activities of the C~ART project include:

- NETWORK AND DATABASE: The project identified and documented already active (art) initiatives in the context of climate change (and sustainability) with the aim of establishing a network as a basis for further activities. Initial questions were: What has happened in this field in Austria so far, or beyond (DE, CH and internationally)?
- **OPPORTUNITIES**: Identifying the opportunities and possibilities for linking climate change and art What role can art play in cooperation with science as a platform for heightening awareness of climate change?
- KLIMA~TATEN~DRANG WORKSHOP: A workshop with broad participation of actors from science and art was held as an online event on 15 October 2020. The purpose of the event was to network, answer specific questions in the context of science/art and to kick off initiatives. What can art/science do in the context of climate change? What are the points of contact and opportunities? What does it take to work together?
- **KUNSTWERKSTATT**: Two art workshops with Hermann Josef Hack focused on the development of specific ideas, art projects and cooperations.

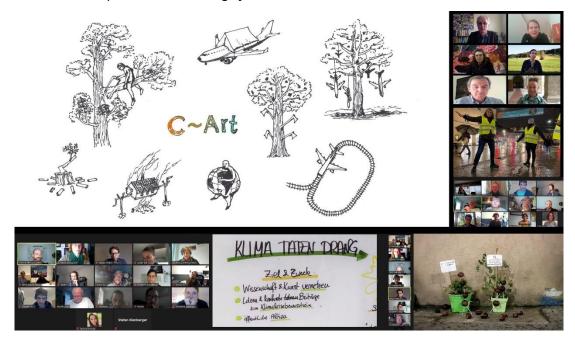
Existing art projects and actions with a focus on climate change were collected and inventoried in a database. A total of seventy-nine art interventions, projects and initiatives were identified that deal with the challenge of climate change. They include visual, literary, performing, applied, digital and multidisciplinary arts, mainly in Austria, but also beyond. This database is an important basis for further research projects.

A fundamental exploration of the possibilities and expectations of both sides was documented on film with interviews with prominent artists and scientists (<a href="https://youtu.be/Rwc8iB5N1Ps">https://youtu.be/Rwc8iB5N1Ps</a>). Questions were asked to capture different or similar perspectives — (i) What does climate change mean to you personally? (ii) What is the role of science in the climate change discussion? (iii) How can science and art work together on this topic? The basic working method of art and science — that of making things visible — was mentioned, or rather the opportunity for art and science to complement one another. Above all, the connection between the "head" and the "heart" offers opportunities to communicate the social challenges in such a way that we can finally generate activities and thus make everyday actions sustainable. The possibilities of art to for posing ethical questions and drawing attention to them complement the role of science in creating knowledge and developing solutions. It is therefore appropriate to use the languages of both disciplines in order to perceive climate change not only as a scientific or technical problem, but also as a cultural one — concerning our culture of action and life.

People make decisions more on the basis of values and emotions than on pure reasoning. Through art it is therefore possible to establish new possibilities for action through trial and error and exploration of the new. The KLIMA~TATEN~DRANG workshop looked more closely at these insights and offered a framework for networking science and art. Possibilities for interaction were identified and first specific ideas – such as boot camps for science and art, the mediation of complex issues or the perception of the ecosystem as a whole – were developed.

Further ideas were implement during the two art workshops (Kunstwerkstatt), resulting in a public action (#ClimateWishFigures) and presentations at the PIXELvienna (<u>www.pixelvienna.com</u>).

C~ART emphasized the importance of creating spaces where art and science can work together freely. It is important to realize that artists cannot be reduced to the role of communicators of scientific content, nor do scientists want to serve the general public as mere invisible results suppliers. The separation of science and art is a result of the industrial age with its demand for of specialization. To develop a vision of a climate-friendly society of tomorrow, it is therefore necessary to revive interaction between science and art. This can only come about through joint action.



**Fig. 3:** : Highlights of the C~ART events and the key visual of the project website drawn by Hermann Hack.

# StartClim2019.H: "Gucci institute, that! – Paul and Linda on a private quest." – A ClimaToon for kids

What do senior secondary school students think of science? The StartClim2019 project "Gucci institute, that! ..." investigated this question, not only out of academic interest but also in an attempt to resolve the most common misunderstandings about the purpose and method of science. Given the target group's age and in order to communicate the content more easily, a comic was considered the format of choice.

The reason for this project was the growing concern about the loss of significance of fact-based and reproducible knowledge in public discourse. This can be seen in the increased media coverage of a post-fact society, fake news or scientific denial of the migration wave in 2015, the US presidential elections in 2015 or Fridays for Future in 2018.

Few societally relevant issues give rise to as much scepticism regarding robust evidence as climate change (and the resulting need for mitigation and adaptation). Objections brought forward by climate sceptics are so similar and repetitive they can be (and are) used as blueprints for Q&As from both parties. Beyond dispute about evidence, the purpose and credibility of scientific method itself keeps being challenged. While in some cases the aim is to damage reputations, the misunderstanding of scientific method is a more common reason for prompting a mistrust in science: acquisition of knowledge through disproof instead of confirmation, revising assumptions for benefit instead of drawback, and simple semantics<sup>1</sup> are in conflict with quotidian heuristics and quickly make science appear unreliable and detached. In 2018, on the other hand, Greta Thunberg entered the scene as a scientific role model whose claim "unite behind the science" motivated a reappraisal of science as a guidance by young people.

We thus set out to explore a possible new impetus of science among senior secondary school pupils. Instead of workshops as initially envisioned, the SARS-CoV-2 pandemic required us to conduct our survey online. While the online medium means reduced interrogatory depth, the web questionnaire increased sample size, and anonymity probably encouraged more outspoken feedback.

About 100 responses from different school types yielded the following core results: the idea of research and scholarship is most readily associated with the sciences,<sup>2</sup> in particular the flagship disciplines physics and chemistry. Accordingly, the (male) physicist dominates the image of an exemplary scientist. The pupils characterized science primarily as interesting, reproducible and trustworthy and considered it the second-most reliable source of information, surpassed only by school. The inclusion of facts and reputable sources was considered the most important indicator for trustworthy scientific news – followed, however, by congruence with individual experience and common sense. In judging reliability (of a published study), surprisingly little weight was given to social media feedback or peer opinion. Perceived conflicts between scientific and alternative explanations were preferentially resolved through compromise or case-by-case – as long as science did not contradict individual experience or religion (which was the most polarizing). While the majority of respondents considered the influence of science in school and everyday life "just right", 60 per cent wanted science to have stronger political influence.

StartClim2019

<sup>&</sup>lt;sup>1</sup> For example, the statistical vs. colloquial meanings of German "Schätzwert" (=estimate vs. ballpark figure)

<sup>&</sup>lt;sup>2</sup> As opposed to humanities and arts



**Fig. 4:** "Was ist Wissenschaft für dich" ("What's science to you?"): the comprehensive online feedback of close to 100 students supported our design of a target-group specific comic book to foster understanding of climate science among young people.

#### **Imprint**

All StartClim2019 reports are available for download under http://www.startclim.at/startclim2019/

If you have questions about the StartClim research programme visit http://www.startclim.at or contact us

#### **Editors**

Nikolaus Becsi

Institute of Meteorology and Climatology

Email: startclim@boku.ac.at

Phone: +43 1 47654-81418

Herbert Formayer

Institute of Meteorology and Climatology

Email: herbert.formayer@boku.ac.at

Phone: +43 1 47654-81415