

## How to tame frontier technologies - lessons from the field And launch of *Assess Technology* website

Tuesday 4 May, 2021  
1:30 – 3:00 pm Eastern Daily Time (US)

Link to register and join: [https://zoom.us/webinar/register/WN\\_w\\_Nim9tMSI2uQZf7j6Hhha](https://zoom.us/webinar/register/WN_w_Nim9tMSI2uQZf7j6Hhha)

### Introduction

ETC Group has played a direct role in challenging two outdoor experiments involving rapidly emerging frontier technologies. Each experiment was promoted to advance the SDGs: one addressing health by reducing the number of malarial vectors in Africa and the other tackling climate change by spraying aerosols in the stratosphere. This session will explore what lessons we can learn from these experiments and launch a new online resource to support the assessment of new technologies: <https://assess.technology/>

### Experiment A: Gene drive mosquitoes in Burkina Faso

A gene drive is a technique, currently still at the experimental stage, that is designed to spread particular genetic traits through a population. Gene drive organisms manipulate the normal sexual reproduction system, forcing a genetic trait into subsequent generations, such that it becomes dominant over a few generations<sup>1</sup>. Modelling suggests that gene drive experiments in the real world could be very risky, with altered genes potentially spreading to places where a species is not invasive but a well-established part of the ecosystem<sup>2</sup>.

The international research consortium Target Malaria (TM) is working to create a gene drive mosquito that would reduce the number of *Anopheles gambiae* mosquitos, the females of which are vectors of malaria. The gene drive modifies the mosquito's fertility gene, causing the females to create only male offspring or not to have any offspring at all. These modified mosquitoes pass on their genes to a high percentage of offspring, spreading these auto-extinction genes throughout the population. In this way, potentially the entire species, could inherit that trait and thus become extinct.

TM is adopting a dual approach, involving the development of gene drive mosquitoes in laboratories at Imperial College, London, UK, in parallel with the release of genetically modified (GM) mosquitoes (not yet engineered to include gene drives) in two villages in Burkina Faso (Bana and Sourkoudingan), which began on 1 July 2019. By obtaining government approval for

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<sup>1</sup> ETC Group (2019) *Gene Drive Organisms An introduction to a dangerous new technology putting Africans at risk*. ETC Group, HOMEF, COPAGEN, AFSA, Terre a Vie. Available at: <https://etcgroup.org/content/gene-drive-organisms>

<sup>2</sup> Noble, C *et al.* (2017). Current CRISPR gene drive systems are likely to be highly invasive in wild populations. *Elife* 7:e33423

these GM releases, TM has eased the regulatory pathway for eventual later release of gene drive insects.

Parties to the Convention on Biological Diversity (CBD), which include the UK and Burkina Faso, are required to seek the approval of ‘potentially affected indigenous peoples and local communities’ prior to considering any release of gene drives, including experimental releases<sup>3</sup>. Investigations by ETC Group suggested that in communities in which the first GM mosquitoes were later released by TM, had not been properly consulted or informed about either element of the project<sup>4</sup>. Local people were therefore not able to make a decision that was based on hearing a balance of viewpoints. Local civil society groups have also expressed concern that there had been no published risk assessment undertaken of TM’s experiments in Burkina Faso.

### **Experiment B: Geoengineering in Sweden**

Geoengineering is the intentional, large-scale technological manipulation of the Earth’s systems, primarily to address the impacts of climate change. In 2010, the CBD adopted a de facto moratorium, stating that no geoengineering activities should be carried out until a “global, transparent and effective control and regulatory mechanism... in accordance with the precautionary approach” can be put in place.<sup>5</sup> The moratorium allows exceptions for small-scale experiments, but only if several conditions are met, including that they are conducted under “a controlled setting.”

Harvard scientists have been undertaking the project Stratospheric Controlled Perturbation Experiment (SCoPEX) to investigate methodologies and hardware in conducting stratospheric aerosol injection (SAI), a solar radiation management (SRM) technology. If deployed, SAI is meant to reduce the amount of sunlight reaching the earth’s surface by injecting sun-blocking particles into the upper levels of the earth’s atmosphere. SCoPEX planned to launch their balloon in Kiruna, northern Sweden in June 2021 in partnership with the state-owned Swedish Space Corporation<sup>6</sup>. The date has now been postponed following a series of protests by Indigenous Peoples and civil society.

The conditions set by the CBD for geoengineering experiments in controlled settings are not met by SCoPEX. While the first stratospheric flight proposed for Kiruna intends to test the balloon and gondola equipment, the stated purpose of the flight was to prepare for the release of aerosols into the stratosphere later in the year in Kiruna. Since the goal of the initial flight is to enable the subsequent release of particles, this planned balloon flight must be viewed as integral to the project’s intention of conducting open-air testing and particle release.

Solar geoengineering has the potential for massive negative impacts on the world’s most vulnerable populations. Droughts in Africa and disruptions in monsoon patterns in Asia are

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<sup>3</sup> FoEI & ETC Group (2018) *Press release: United Nations Hits the Brakes on Gene Drives*. Available at: [https://www.etcgroup.org/sites/www.etcgroup.org/files/files/etc\\_foe-i\\_news\\_release\\_un\\_puts\\_brakes\\_on\\_gene\\_drives.pdf](https://www.etcgroup.org/sites/www.etcgroup.org/files/files/etc_foe-i_news_release_un_puts_brakes_on_gene_drives.pdf)

<sup>4</sup> Molloo, Z (2018) Cutting Corners on Consent. *Project Syndicate* December 19. Available at: <https://www.project-syndicate.org/commentary/target-malaria-gene-drive-experiments-lack-of-consent-by-zahra-molloo-2018-12>

<sup>5</sup> Decision X/33 8(w), COP10 CBD

<sup>6</sup> Keutsch Group (2020) *SCoPEX Statements: Press Release*. 15 December 2020. Available at: <https://www.keutschgroup.com/scopex/statements>

among the major risks identified by computer modelling<sup>7</sup>. The sources of food and water for 2 billion people could be disrupted. SRM deployment would also lock in the world in this technology since aborting it could result to “termination shock” that involves rapid rise in global temperature<sup>8</sup>.

## Lessons learned

The Target Malaria and SCoPEX cases described above demonstrate the usefulness of the fundamental principles of sustainable development in interrogating the application of frontier technologies to address key developments challenges.

### 1. Precautionary Principle

Both cases, though still at research and development stage, underline the need to apply the precautionary principle. The principle emphasizes caution, pausing and review before leaping into new technologies that, if deployed may prove disastrous. Where there is doubt, the enactment of the precautionary principle does tend towards policies that prevent the release of potentially harmful technologies. The principle does not necessarily mean a ban on new technologies or stopping research, but urges that opportunities be created to address concerns using an appropriate range of perspectives.

### 2. Free and Prior Informed Consent

Any outdoor experiment of frontier technology applications need to undergo transparent, democratic and thorough consultations in communities, in particular indigenous and local communities, that will be potentially affected by the technology. Civil society in Burkina Faso have raised concerns on the absence of consultation and information in Target Malaria’s release of GM mosquitoes and the parallel research on gene drive mosquitoes. The recent decision of the Swedish Space Corporation to postpone the SCoPEX open field trial in northern Sweden following objections from civil society, experts and indigenous communities.<sup>9</sup>

### 3. Access to information, participation in decision-making and access to justice.

In both experiments, there was barely any information provided to the public. Decision-making was limited to that provided by partner institutions in the country that hosted the field trials. Civil society in Burkina Faso have tried without success to access information on releases of GM mosquitoes from the government. The government-owned space centre in Sweden did not provide further details on the modalities of the experiment and the nature of its partnership with the proponents of SCoPEX. Public access to information is a prerequisite to meaningful community participation in decision-making on matters relevant to the environment. Transparency in decisions on field testing of frontier technologies is key to redress and liability in case of adverse consequences to the environment and people.

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<sup>7</sup> Robock, A *et al.* (2009) “Benefits, risks and costs of stratospheric geoengineering”, *Geophysical Research Letters*, 36:19. Available at: <https://agupubs.onlinelibrary.wiley.com/doi/10.1029/2009GL039209>

<sup>8</sup> ETC Group 2018 *Big Bad Fix: The Case Against Climate Geoengineering*. Available at: <https://www.etcgroup.org/content/big-bad-fix>

<sup>9</sup> Fountain, H & Flavelle, C (2021) “Test Flight for Sunlight-Blocking Research Is Canceled”, *New York Times*. 2 April. Available at: <https://www.nytimes.com/2021/04/02/climate/solar-geoengineering-block-sunlight.html?searchResultPosition=1>

#### 4. Intergenerational equity

Gene drive organisms would change the dynamics among organisms in an ecosystem, would disrupt ecological balance and have unknown consequences on the environment and people. Stratospheric aerosol injection would lock the world into a technology for generations since halting its deployment would result to “termination shock” that could dangerously exacerbate global warming.<sup>10</sup> Deployment, including real-world experiments, of frontier technologies that are largely untested, speculative and potentially dangerous for the planet that will be inherited by the next generations, thus violates justice principles.

#### 5. Avoiding technology lock-in

There is common feature in both experiments described here, which is that they are a Trojan Horse - a ‘first-step’ experiment designed to clear the way for more significant interventions in the near future. In Sweden, the objective of the initial SCoPEX flight was presented as being merely to test equipment, but was seen by many as a deliberate attempt to normalise the move to experimentation with aerosol release in the stratosphere. In Burkina Faso, Target Malaria are explicit that they are releasing GM mosquitos without gene drives as a means to test and prime the regulatory system for later gene drive releases. In each case, those recommending precaution are not simply highlighting the risks posed by a specific experiment, but questioning (and rejecting) the wider policy direction behind the experiment. Researchers on new technologies have identified the related syndrome of ‘lock-in’, whereby deepening institutional and economic commitments to big science projects create a path-dependence, leading to decision-makers becoming locked-in to deployment and commercialization of those projects when they are not necessarily the best option. Calls to move away from precaution towards ‘case by case’ policy making risks increasing such path-dependence.

### Next steps

To attain the aspiration of the 2030 Agenda for Sustainable Development to “leave no one behind”, the Rio Principles must remain as the fundamental metrics for consideration of new and emerging technologies as tools to attain the SDGs. Broad societal deliberation on frontier technologies and their potential environmental, health, economic and social impacts must be a prerequisite for their development and deployment. We will discuss participatory mechanisms for evaluation of new and emerging technologies need to be established at the global, regional and local levels, illustrated by the new online resource developed by ETC Group, <https://assess.technology/>. Panellists will be invited to discuss how the UN should help provide countries and institutions with technology assessment and horizon-scanning capacities, as envisioned in the “Future We Want” outcome document of Rio+20<sup>11</sup>.

### Co-organisers:

Civil Society FfD Group, MGCY, AP-RCEM, Women’s Major Group

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<sup>10</sup> Pierrehumbert, R. (2017) “The trouble with ‘geoengineers’ hacking the planet”, *Bulletin of Atomic Scientists*, 23 June. Available at <https://thebulletin.org/2017/06/the-trouble-with-geoengineers-hacking-the-planet/>

<sup>11</sup> UN DESA (2012) “The Future We Want”, para 275, UN DESA. Available at: <https://sustainabledevelopment.un.org/futurewewant.html>