

# SOY STORIES:

## Connected (sustainability) histories and futures of the global Soyacene

Erik van der Vleuten (Eindhoven University of Technology)  
Evelien de Hoop, Jacqueline Broerse (Vrije Universiteit Amsterdam)  
Claiton M. da Silva (Universidade Federal da Frontera Sul)

### Note to the reader

*This text stems from a research proposal awarded by the Dutch research council NWO in its Open Competition round 2021-22. We hereby share it with the academic community with minor changes. Please note that since then, numerous project adaptations have been made, and will continue to be made. Notably, we emphasize the need to further decenter the term sustainability (in particular when used as an analytical concept without reflecting on the ideologies with which it has been imbued over the past decades; Gómes-Baggethun 2019), and to rethink the notion of hi/stories.\**

### Abstract

Different regions across the globe face grave challenges that may be at once highly diverse and highly interconnected. The research project SOY STORIES investigates diverse Brazilian and Dutch histories connected by soy, and studies how a connected diversity perspective can contribute to imagining more inclusive sustainable futures. Since the 1970s, accelerating soy production in Brazil has been associated with regional challenges such as large-scale deforestation, land-grabbing and a pesticide crisis. Meanwhile soy-based intensive animal farming in the Netherlands came with challenges such as a 4-decades-long national manure and nitrogen crisis, public health hazards, greenhouse gas emissions and animal welfare problems. Studying these *connected* histories of *diverse* challenges – challenges which could be characterized as sustainability challenges – we aim to develop an alternative approach to sustainability histories that either produce fragmented microhistories or reductionist (often Western-centric) global master narratives. Moreover, by working with a broad variety of social partners, we aim to simultaneously develop more plural and inclusive histories, and investigate if and how developing these plural-and-connected histories may inspire different (i.e. respecting plural ways of being on both sides of the Atlantic) modes of engagement with sustainability challenges today—which, too, tend to alternate between parochialism and universalism. This research proposal (1) introduces the research aims, (2) develops a tentative conceptualization and (3) research design, (4) discusses research methods, (5) articulates envisioned contributions to the fields of sustainability history and to transdisciplinary sustainability research and (6) discusses societal relevance.

---

\* Also, we apologize for occasional proposal-speak, such as bold claims to excellence, innovativeness and impact that do not befit the modesty with which we wish to work. Furthermore, in preparing this proposal, we acknowledge feedback and support from a number of persons. They include Jonas van der Straeten, Henny Romijn, Carmen Rodarius (all TUE), Geert Somsen, Anne Loeber, Marjoleine van der Meij, Barbara Regeer, Walter van Raaij, Karin Rade (all VU), and Samira Peruchi Moretto (UFFS). Herman de Boon and Heleen de Coninck helped us contact societal partners who gave important feedback, who we for reasons of anonymity do not list here at this point.

## 1. INTRODUCTION

Different regions across the globe face grave sustainability challenges that may be at once highly diverse and highly interconnected. We currently fail to understand the connected histories of this plurality of challenges: regional sustainability histories are predominantly studied in isolation from one another or as instances of generic ‘global’ sustainability challenges (Caradonna 2018). This is not only historiographically problematic, but also societally, because the neglect of connected sustainability histories may entrench a similar neglect in future imaginaries, by-and-large ignoring how addressing one region’s sustainability challenges affects sustainability challenges elsewhere.

SOY STORIES therefore investigates the plural-and-connected sustainability histories of a particularly prominent case: the sustainability challenges related to the production of soybeans in Brazil and the use of soybeans in the Netherlands (figure 1). Moreover, and crucially, we combine historical research with transdisciplinary sustainability research (TDR) to study and evaluate how this novel historical knowledge can inform the development of more inclusive sustainable future imaginaries—inclusive of sustainability challenges on *both* sides of the Atlantic. In doing so, we contribute to soy historiography and to the vibrant fields of sustainability history and transdisciplinary research for sustainable futures.

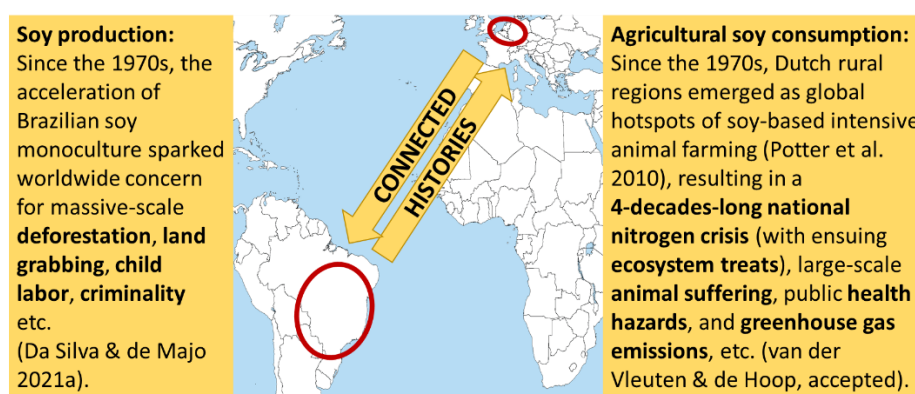


Figure 1. SOY STORIES investigates Brazilian and Dutch regions’ plural soy-connected sustainability histories and future imaginaries. Historians speak of a veritable ‘Soyacene’ (Da Silva & de Majo 2021a).

SOY STORIES thus has two interrelated research objectives, namely:

- (1) enriching sustainability history with a plural-and-connected approach to study interrelated sustainability challenges—for the case of Brazilian and Dutch sustainability challenges connected by soy;
- (2) rendering such plural-and-connected soy sustainability research actionable, in a reflexive manner, for the development of *inclusive sustainable future imaginaries* in both regions.

To realize these objectives, SOY STORIES combines expertise in sustainability history and transnational history on both sides of the Atlantic (History Lab TUE, NL and UFFS, Brazil) with, unique for historical research, expertise in TDR (Athena Institute, VU, NL). Hence, it seeks to develop new approaches for both historiography and TDR.

## 2. CONCEPTUALIZATION AND RESEARCH QUESTIONS

We develop our analytical approach based on an innovative combination of selected work from the following literatures: sustainability history, global (environmental) history, sustainability knowledge politics, and TDR.

### 1. A plural-and-connected approach

Our plural-and-connected approach (objective 1) builds on three key notions: **plural sustainability hi/stories** (our research object), **connected histories** and **transregional sustainability politics** (our analytical concepts).

#### 1a. The research object: plural sustainability hi/stories

We engage with sustainability history to clarify the three constituent terms of *plural sustainability hi/stories*. Concerning hi/stories, we take the lead from sustainability historians who study regional or global sustainability *narratives* (cf. Grober 2012; Caradonna 2014; Warde 2018; Schleper 2019). SOY STORIES studies historical actors' narratives, which we refer to as hi/stories (cf. van der Vleuten & de Hoop, 2022). Inspired by (critical) historical discourse analysis, we investigate such narratives' historical context, characters and events, emplotments, and temporal dynamics (Achugar 2017; Knudsen, & Gram-Skjoldager 2014; Flowerdew 2012).

Concerning *plural* hi/stories: Historical actors articulate their regions' key challenges and whether regions can sustain themselves in diverse and conflicting ways (Warde 2018). SOY STORIES therefore takes the lead from recent sustainability history inspired by Warde (2018) which *denaturalizes* and *politicizes* sustainability narratives by researching the multiple and potentially conflicting narratives that diverse actors tell about soy-related sustainability challenges (Moss & Weber 2021; Van der Vleuten & de Hoop 2022).

Finally, concerning *plural sustainability* hi/stories: The novel field of sustainability history interconnects the long-standing fields of economic, social, and environmental history (Caradonna 2018). Researching regional sustainability histories, the field eschews *a priori* definition of the contested and anachronistic term 'sustainability', which some associate with universalistic, growth-preserving, or neocolonial ideologies (Bonneuil & Fressoz 2016:20; Elliott et al. 2017:4). SOY STORIES, too, uses 'sustainability' as a sensitizing concept to study historical actors' *entwined economic, social and environmental narratives* (Caradonna 2018) of the *endurance, collapse or transformation of livelihoods and ecosystems* (in a variation on Warde 2018: 5), regardless of whether they use the term 'sustainability'.

Given these considerations, SOY STORIES starts out by identifying and contrasting diverse historical actors' sustainability hi/stories within Dutch and Brazilian regions (see research question 1a).

#### 1b. Analysing sustainability hi/stories as connected histories

Next, SOY STORIES analyses how sustainability hi/stories on both sides of the Atlantic were interconnected. SOY STORIES takes a relational historiographical approach, as developed in both global and transnational history (Epple 2018) and global environmental history (O'Gorman & Gaynor 2020), which studies the specificity and diversity of interrelated regional histories. This is distinctly different from a *history of relations*, which traditionally focussed on the *relations* between entities, and which tends to study diverse histories across the globe from the perspective of a common logic (e.g.

capitalism) (Beckert et al. 2021a; 2021b; Marques 2021; Wentzluhmer 2020; Heymann et al. 2020; Johnson 2022). Instead, SOY STORIES particularly draws on the relational historiographical tradition of connected history, which studies how diverse interrelated histories of distant regions articulated each-other (Subrahmanyam 1997, 2017; De Hoop & Vleuten 2022). SOY STORIES hence asks how Brazilian sustainability hi/stories were variously (un)represented in connected Dutch sustainability challenges and *vice versa* (see research question 1b).

### **1c. Analysing the transregional politics of sustainability hi/stories**

Finally, SOY STORIES asks ‘so what?’: why is it important to study how plural sustainability hi/stories in both regions (did not) represent each-other? Its answer is that this matters greatly for the sustainability politics involved in addressing their sustainability challenges.

Here, we take our cue from the emerging literature informed by Science and Technology Studies (STS) and governmentality on sustainability knowledge politics (Jenssen et al. 2018; Voß & Freeman 2016), which argues that what and whose concerns are made (in)visible in sustainability knowledges and narratives has implications for what and whose concerns feature in imaginaries for more sustainable futures. When deployed in the context of transregionally connected sustainability challenges, this approach also directs attention towards the geographical location of actors whose concerns and responsibilities do (not) feature in imagined futures (see De Hoop & van der Vleuten 2022 for the case of palm oil research). SOY STORIES therefore investigates hi/stories’ articulations of the future with respect to *which and whose sustainability futures, for which regions, were foregrounded and backgrounded, and who, from where, was made responsible for realizing these futures (or acquitted from such responsibilities)* (see research question 1c).

### **2. Actionable historiography: towards more inclusive sustainable future imaginaries**

To realize objective 2, we combine historiography with transdisciplinary research for sustainable futures (TDR) to investigate empirically how soy STORIES’ historiographical knowledge may reshape present-day imaginaries of the future (research question 2a) and to study how both historiography and TDR can learn from each other (research questions 2b and 2c).

Reflexive actionable historiography: TDR studies and reshapes scientific knowledge production processes to contribute to better science and to more sustainable futures (Bunders, Broerse et al. 2010; Kok et al. 2021, Fazey et al. 2020; Köhler et al. 2019; Fransman 2018). Key therein is the notion of reflexivity, which includes monitoring how research activities contribute to addressing a particular societal problem. Crucially, TDR does not self-identify with societal problems: reflexivity also implies monitoring changes in problem- and solution statements (van Mierlo et al. 2010; Loeber et al. 2007). SOY STORIES’ hence investigates if and how its hi/stories contribute to more inclusive (i.e. (inclusive of challenges across the Atlantic) sustainable future imaginaries among contemporary stakeholders of soy-connected sustainability challenges, while also critically interrogating what ‘inclusive sustainable future imaginaries’ may come to constitute in the process (see question 2a).

Implications for historiographical research: TDR argues that rendering scientific knowledge actionable requires reshaping the knowledge production process in collaboration with present-day stakeholders (Mach et al. 2020; Turnhout et al. 2020; Kok et al. 2021; Nowotny et al. 2003; Lang et al. 2012). However, critics warn against instrumentalization of history, presentism, and compromising critical historical distance (for a recent discussion: Moss & Weber 2021; Holbrook & Lowe 2021). To avoid

these noteworthy pitfalls, SOY STORIES draws on the notion of reflexivity introduced above to create critical distance: throughout the research process, SOY STORIES will make explicit how, for what reasons and with what implications, stakeholders' contributions play a role in its research (cf. de Hoop 2020; Zuiderent-Jerak 2015; Mobjörk 2010). This critical distance, along with SOY STORIES' pluralization and politicization of sustainability narratives (objective 1), is what allows SOY STORIES to combine critical historiography with making relevant contributions to address today's soy-connected sustainability challenges (cf. Tosh 2014). Given the novelty of drawing on TDR for historical research, SOY STORIES investigates the implications thereof for historical research practices and approaches (see research question 2b).

Implications for TDR: SOY STORIES uniquely brings connected histories to TDR. Existing TDR is predominantly geared towards understanding and addressing present-future relations of geographically delineated sustainability challenges, and engagement with history and connected challenges has been limited so far (Fazey et al. 2020; van Mierlo et al. 2010). Indeed, some TDR scholars caution that drawing on historical knowledge can constrain imaginations of the future (Fazey et al. 2020). However, SOY STORIES' pluralization of sustainability histories has the potential to open up rather than constrains future imaginations. SOY STORIES therefore explicitly investigates *how* connected historiography can enrich TDR practices and approaches (see research question 2c).

## Research questions

1. **How did soy-related sustainability hi/stories in Brazil and the Netherlands connect and interact, and with what implications (1950s-now)?**
  - a. PLURALITY AND DIVERSITY: Which and whose sustainability hi/stories can be identified within each region, and how do they differ from each other?
  - b. CONNECTED HISTORIES: How do these hi/stories engage with or ignore *overseas sustainability hi/stories* (particularly in Brazil and the Netherlands)?
  - c. SUSTAINABILITY POLITICS: What are the implications of the answer to the foregoing subquestions for *which and whose sustainability futures, for which regions*, these hi/stories articulated, and *who, from where*, was (not) made responsible for realizing these futures?
2. **How can plural-and-connected sustainability history knowledge become actionable, in a reflexive manner, for the development of more inclusive sustainable future imaginaries?**
  - a. STUDY ACTIONABILITY: How do SOY STORIES' plural-and-connected sustainability hi/stories reshape present-day stakeholders' imaginaries of sustainable and inclusive futures?
  - b. IMPLICATIONS FOR HISTORIOGRAPHY: What are the implications of drawing on TDR to render historical knowledge actionable, in a reflexive manner, for historical research?
  - c. IMPLICATIONS FOR TDR: How can plural-and-connected sustainability historiography enrich transdisciplinary sustainability research for more sustainable and inclusive futures?

### 3. RESEARCH DESIGN

Answering RQ1a, 1b, 1c and 2a requires symmetrical engagement with soy sustainability hi/stories and future imaginaries in Brazil and in the Netherlands, which therefore constitute the focus of WP1 (PhD1) and WP2 (PhD2), respectively. Close collaboration between both WPs will be realized through our research design (see below), work plan (section B6) and shared PhD supervision. This is critical to study how one region's hi/stories and future imaginaries engaged with or ignored overseas hi/stories and future imaginaries (RQ1b and 2a). WP3 answers RQ2b and 2c, and provides methodological support to WP1 and WP2 to answer RQ2a. WP4 synthesizes all project results to answer overarching RQ1 (for both Brazil and the Netherlands at the same time) and 2.

Table 1: Work Packages

Work packages	Research question
WP1: Brazilian connected soy sustainability hi/stories and future imaginaries	1a, 1b, 1c, 2a for Brazilian regions
WP2: Dutch connected soy sustainability hi/stories and future imaginaries	1a, 1b, 1c, 2a for Dutch regions
WP3: Methodological and conceptual innovation in historiography and TDR	2b, 2c; 2a support
WP4: Synthesis	1 and 2

#### Research design

SOY STORIES starts with a double baseline study of soy historiography and present-day stakeholders' conceptions of past, present and future. Next, alternating phases of historical research (WP1&2, RQ1a, 1b and 1c) and TDR-based stakeholder interaction (WP1&2, RQ2a) are supported by continuous methodological and conceptual innovation and reflection (WP3, RQ2b and 2c) and a science museum exhibit. This iterative design allows for continuous adaptation based on progressing insights, which is critical to exploit stakeholders' sensitivities to broaden and politicize our historical research, and to render SOY STORIES' historical knowledge actionable for more *inclusive sustainable future imaginaries*. This design will be used simultaneously in Brazil and in the Netherlands. WP1 and WP2 collaborate closely: the two PhDs will be required to set and adjust their research approach together, and will share and contrast their findings at the end of each phase of in-depth historical research. All Brazilian and Dutch historical research findings (RQ1a, 1b and 1c) will be discussed with both Brazilian and Dutch stakeholders (informing RQ2a). Section B6 translates this research design into a work plan with timeline.

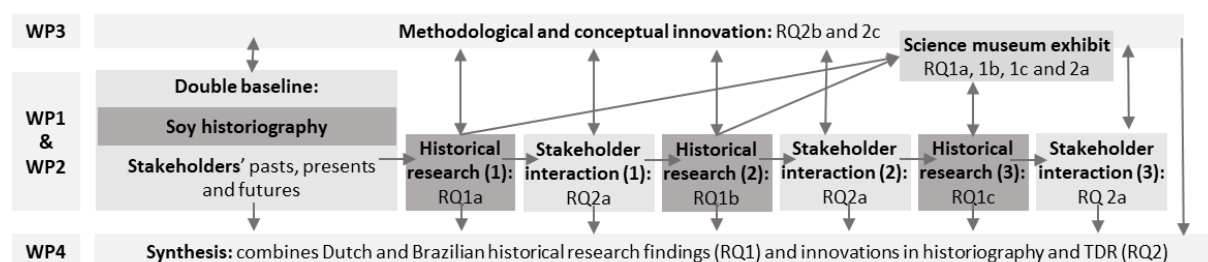


Figure 2: Research design

## 4. METHODS AND SOURCES

### Historical research

Temporal delineation: SOY STORIES identifies and investigates hi/stories produced by historical actors in relevant Dutch and Brazilian regions from the 1950s until today. In the 1950s, the foundations for industrial agriculture were put in place in both countries, preparing the 1970s acceleration of Brazilian soy cultivation and Dutch soy-based intensive animal farming (da Silva & de Majo 2021a; Haalboom 2020; Van der Vleuten & de Hoop in press). Longer timeframes are only studied as articulated by investigated hi/stories (e.g. their attributions of their sustainability challenges' origins to earlier periods).

Spatial delineation: SOY STORIES studies regional hotspots: e.g. the Atlantic forest (the first Brazilian region exporting soy to Europe and birthplace of the agribusiness approach dominant across Brazil's soy plantations today), the Cerrado (where soy cultivation expanded in the early 2000s) (da Silva & de Majo 2021a), the Dutch Peel (an early and highly controversial factory farming hotspot) (van der Vleuten & de Hoop, accepted), and peatlands around Amsterdam (only suitable for animal farming yet threatened by soil subsidence; van der Weijden et al. 2021). Other regions (e.g. in China, North America) are only studied as articulated by investigated hi/stories'.

Actor selection: SOY STORIES maximizes diversity by investigating both dominant historical actors' hi/stories and hi/stories of historical actors who complemented or challenged the former. Examples in Brazil include: Alprosoja (soybean producers' association), EPAGRI (State Rural Extension Company), former state secretary of agriculture Airton Spies, the Landless Workers Movement, and farmer advisors (vereador). For the Netherlands: the former Ministry of Agriculture and Fishing, the Cebecco-Handelsraad, local farmers' associations, and Friends of the Earth Netherlands. Definite actor selection will take place after the double baseline study (figure 2).

Sources & methods: Investigating both dominant and non-dominant actors' hi/stories (often absent from conventional sources) requires combining analysis of a wide diversity of written sources (table 2) with oral history (cf. Hecht 2012). To conduct oral history, we will interview elderly who will be identified through snowballing (with historical sources and present-day stakeholders as entry points). Our analysis will be guided by research questions 1a, 1b and 1c (following Jóhannesson 2010). For digitized sources, we draw on our experience with digital humanities methods to meaningfully analyse large numbers of records (de Hoop and van der Vleuten, in press).

*Table 2: Inventory of written sources (accessible publically/through partners), to be adapted during the baseline study*

<p><b>Media</b>  <b>NL:</b> Delpher; LexisNexis  <b>BR:</b> Media databases, e.g. O producto (São Paulo); Ciência para todos (RJ); A Agricultura (Santa Catarina)</p> <p><b>Government</b>  <b>NL:</b> Historical Dutch Parliamentary debates and documents.</p>	<p><b>NGOs</b>  <b>NL:</b> IISG Amsterdam (archives of multiple NGOs)  <b>BR:</b> Instituto socioambiental; WWF Brazil</p> <p><b>Companies</b>  <b>NL:</b> Cebecco-Handelsraad (former agricultural purchasing association); Nevedi (feed producers' association); FrieslandCampina (largest dairy producer)</p>
--	--



<b>BR: Digital Hemeroteca (national digital archive)</b>  <u>Science</u> <b>NL+BR: Scopus, Web of Science, Google Scholar</b>	<b>BR: Cooperalfa (former major agricultural cooperative)</b>
--	---

### Stakeholder interaction

Stakeholder selection: To maximize diversity, we engage with 16 stakeholder organizations on an annual basis: two (with different interests and outlooks) per *Quadruple Helix* category (industry, government, NGOs, research; cf. Carayannis and Campbell 2009) per country. All selected stakeholders seek to address soy-related sustainability challenges and have expressed willingness to openly discuss their ideas (see table 7 in section B6).

Methods: SOY STORIES faces three challenges to answer RQ2a: existing TDR's stakeholder interaction methods 1) are geared towards present-future relations; 2) focus on individual (global North) sustainability challenges (van Mierlo et al. 2010; Breda & Swilling 2018); and 3) draw heavily on constructive interaction between stakeholders, but soy-related sustainability challenges are highly sensitive. To address challenge 1 and 2, WP3 innovates existing TDR methods developed by the co-applicant's Athena Institute to engage with past-present-future relationships, transnational connections, and Brazilian contexts (table 3). To address challenge 3, stakeholder interaction will initially take place one-on-one. Multi-stakeholder meetings to deepen the analysis will be organized based on careful choices with regard to who participates, the setting and deliberation format, and the discussion agenda (cf. Chilvers & Longhurst 2016).

Science museum exhibits: following recent science museology (see Schuijjer et al., 2022 – the co-applicant is co-author; Bandelli & Konijn, 2015), the science museum exhibits perform knowledge dissemination and citizen science by encouraging (elderly) visitors to share and record their own soy-related hi/stories (towards RQ1a, 1b, 1c) and by inviting its visitors to debate the implications of SOY STORIES' hi/stories for inclusive sustainable future imaginaries (towards RQ2a). Relevant musea that confirmed to host the exhibits: Discovery Museum, Centro de Memória de Oeste Catrinense.

Table 3: TDR methods, focus & key innovations

Method	Focus	Innovation
System analysis (van Mierlo et al. 2010)	Identify relevant historical actors. <i>Informs the historical research approach</i>	Include historical legacy and transnational connections in system analysis
Transformation-frame (Huitzing et al. 2021)	Map and monitor stakeholders' future imaginaries in relation to their ideas on the present-day and the past. <i>Used to answer RQ2a</i>	Expand here-and-know focus with historical and transnational dimensions
<b>Science Museum Exhibit</b>	<b>Knowledge dissemination and citizen science.</b> <i>Used to answer RQ 1 and 2a.</i>	<b>Develop transnationally interconnected exhibits.</b>



## 5. ACADEMIC RELEVANCE

The ground-breaking character of SOY STORIES stems from intimate collaboration between sustainability historians from both sides of the Atlantic and TDR. This section outlines our key innovations, scientific relevance and urgency with respect to especially sustainability history and TDR.

### **Plural, connected and transformative sustainability histories**

The young field of sustainability history has two important and timely ambitions: it (1) places the entwinement of economic, social, and environmental histories center-stage; and (2) explicitly connects historiography to present-day sustainability debates (research agenda: Caradonna 2018). We make two critical contributions. First, SOY STORIES pioneers a novel approach to study plural-and-connected sustainability histories. This approach engages with *global* sustainability challenges while simultaneously bringing highly *diverse* articulations and priorities across the globe to the fore. This is crucial: without such an approach, sustainability history risks (rightful) dismissal as either (a) yet another unreflective projection of ‘Global North’ concerns onto the globe with its quasi-universal histories of predominantly global North sustainability ideas (Grober 2012; Caradonna 2014; Warde 2018; Schleper 2019); or (b) parochialist, producing regional sustainability histories that ignore or black-box (e.g. through a footprint approach, cf. Lintsen 2018) interrelated regions. Second, SOY STORIES addresses sustainability history’s important yet poorly substantiated aim to inform present-day sustainability debates: we integrate TDR research approaches in historiographical research and systematically research the effects thereof. The scarce sustainability historiography (and related environmental and technological historiography) that uses related concepts (e.g. applied history, public history and usable pasts) currently does not proactively investigate the impacts of their historiography (cf. Hirsch & Jones 2014; Divall et al. 2017; Emanuel et al. 2020; Rubio Varas et al. 2021; Moss & Weber 2021).

### **Transdisciplinary sustainability research (TDR)**

TDR seeks to reshape knowledge systems to address pressing sustainability challenges (research agendas: Fazey et al. 2018; Caniglia et al. 2021). SOY STORIES makes three critical contributions to this ambition. First, SOY STORIES introduces engagement with historical knowledge. Plural and connected historiography has the potential to bring a wealth of different paradigms, ways of thinking and imaginations to the fore. This is crucial to TDR: while it stresses the importance of transcending current paradigms, ways of thinking and imaginations (Fazey et al. 2018), its focus on present-day challenges and their solutions constrain its imaginations (Kok et al. 2021).

Second, SOY STORIES introduces engagement with connected sustainability challenges and their geographically dispersed stakeholders. This is an important and timely contribution because many of today’s sustainability challenges are highly connected and multi-sited, yet TDR has predominantly been applied to single-site cases (den Boer et al. 2021).

Third, SOY STORIES places sustainability politics center stage both in its empirical research (RQ1c) and in its methodological innovations (RQ2b and 2c), thereby enlarging the space for diverse voices, ways of living and future imaginations rather than subsuming stakeholders’ diversity under a single overarching logic that erases differences from view. This is important: when TDR projects fail, this can often be attributed to insufficient space for diversity and attentiveness towards the role of politics in researching and addressing sustainability challenges (Turnhout et al. 2020).

## 6. Societal relevance

Because SOY STORIES investigates how historiography can be rendered actionable, producing societal impact is an integral part of the research project. Figure 3 presents the societal output, outcome and impact we would hope to realize, following NWO's definition of the terms. We would like the reader to engage with the figure and text below as an attempt to critically engage with the possible performativity of our work, rather than a prediction of the future.

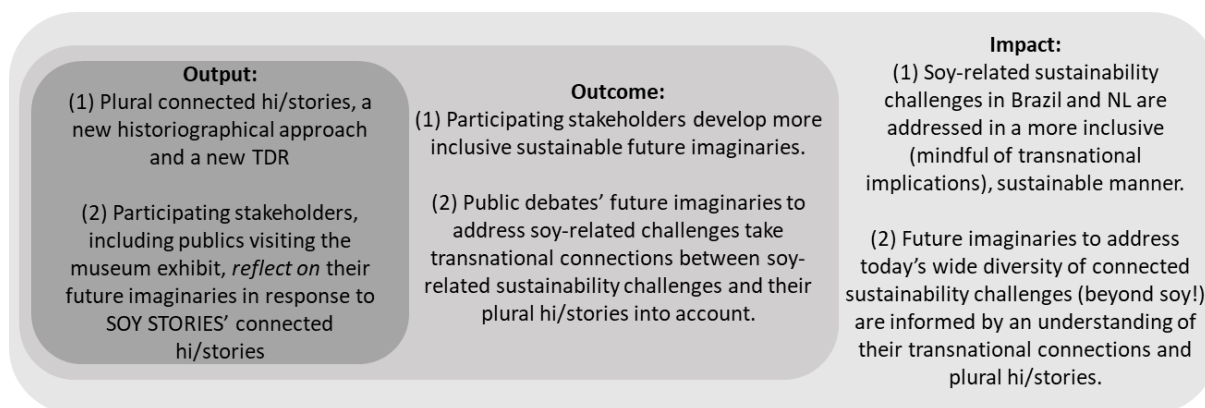


Figure 3: Impact pathway

To work towards output (1), SOY STORIES combines diverse historical research approaches with TDR. To work towards output (2), SOY STORIES conducts *high-quality productive interactions* (in NWO terms) with visitors of the museum exhibit and with diverse stakeholders. With regard to the latter, SOY STORIES organizes yearly reflection sessions with stakeholders to discuss the implications of SOY STORIES' historical research findings for stakeholders' soy-related future imaginaries, using cutting-edge TDR methodologies (table 3). To contribute outcome (1), SOY STORIES produces historical knowledge that is inclusive in nature: it includes both dominant and non-dominant actors' hi/stories. Furthermore, the research design (see figure 2) seeks to render these historical investigations relevant to (and also critically assess) stakeholders' present-day concerns. With regard to outcome (2), SOY STORIES takes part in the public debate on soy in the Netherlands and in Brazil through its engagement with key stakeholders and through the establishment of an interactive science museum exhibit in which publics debate the implications of SOY STORIES' hi/stories. Outcome (2) is important for impact (1). Wide dissemination of SOY STORIES' research results will also be part of our hope to realize impact (1). Finally, SOY STORIES hopes to be a starting point for a new way of both historiographical and future-oriented research to be applied in the context of a wide diversity of connected sustainability challenges (relevant for impact (2)).

SOY STORIES actively creates opportunities for unforeseen knowledge utilization and societal impact during all phases of the NWO Impact Outlook Approach's 'Cycle of curiosity-driven research'. First, we mobilize our collaboration with diverse key stakeholders to acquire additional funding and identify additional outlets for knowledge sharing and utilization. Second, through stakeholders' active involvement, we hope to enhance the relevance of, and stakeholders' ownership of, the historical knowledge that is produced, and thereby enhancing the likelihood of knowledge utilization. Third, understanding and improving knowledge utilization constitutes a key research focus in SOY STORIES, and progressive insight thereon will inform continuous adaptation of our research approach to strengthen both scientific quality and knowledge utilization.

## REFERENCES

- Achugar, M. (2017). Critical discourse analysis and history. In: Flowerdew, J., Richardson, J. E. (eds.), *The Routledge handbook of critical discourse studies* (Routledge), 298-311.
- Bandelli, A, and EA Konijn (2015). Museums as Brokers of Participation. *Science Museum Group Journal*, Spring.
- Beckert, S. et al. (2021a). Commodity frontiers and the transformation of the global countryside: a research agenda. *Journal of Global History*, 16(3), 435-450.
- Beckert, S. et al.(2021b).Commodity frontiers and global histories: tasks ahead.*Journal of Global History* 16(3) 466-469.
- Bieleman, J. (1999). Landbouw en milieu—een eeuwig spanningsveld? In: G. Castryck, M. Decaluwe (eds.), *De relatie tussen economie en ecologie gisteren, vandaag en morgen* (Verloren), 25-36.
- Bieleman, J. (2010). *Five centuries of farming: a short history of Dutch agriculture 1500-2000* (Wageningen Academic).
- Bonneuil, C., JB Fressoz (2016). *The Shock of the Anthropocene: The Earth, History and Us* (Verso).
- Bray, F. et al. (2019). Croscapes and History. *Transfers* 9, No. 1, 20–41.
- Bunders, J. F., Broerse, J. E. et al. (2010). How can transdisciplinary research contribute to knowledge democracy? In: *Knowledge democracy* (Heidelberg: Springer): 125-152.
- Caniglia, et al. (2021). A Pluralistic and Integrated Approach to Action-Oriented Knowledge for Sustainability. *Nature Sustainability* 4(2): 93–100.
- Caradonna, J. (2014). *Sustainability: A history*. Oxford University Press.
- Caradonna, J. (2015). The Historiography of Sustainability: An Emergent Subfield. *Economic- and Ecohistory* 11.1: 7-18
- Caradonna, J. ed. (2018). *Routledge handbook of the history of sustainability* (Routledge).
- Carayannis, E. and D. Campbell (2009). "Mode 3" and "Quadruple Helix". *International Journal of Technology Management* 46: 201-234.
- Chilvers, J. and M. Kearnes,eds.(2016). *Remaking Participation: Science, Environment and Emergent Publics* (Routledge)
- Crijns, A.H. (1998). *Van overgang naar omwenteling in de Brabantse land-en tuinbouw 1950-1985*. (Tilburg: SZHC).
- Da Silva, C.M. and C. de Majo (2021a). Towards the Soyacene: Narratives for an Environmental History of Soy in Latin America's Southern Cone. *Historia Ambiental Latinoamericana y Caribeña* 11.1: 329-356.
- Da Silva, C. M., & C. De Majo (2021b). Genealogy of the Soyacene: The tropical bonanza of soya bean farming during the Great Acceleration. *International Review of Environmental History*, 7(2): 65-96.
- Da Silva, C.M. et al. eds. (2022). *The Age of Soybean* (White Horse Press).
- De Hoop, E. (2020). More Democratic Sustainability Governance through Participatory Knowledge Production? *Sustainability* 12(15): 6160.
- De Hoop, E. & E. van der Vleuten (2022). Sustainability Knowledge Politics. Southeast Asia, Europe, and the Transregional History of Palm Oil Sustainability Research. *Global Environment* 15(2), 209-245.
- De Hoop, E., Sridhar, A., da Silva, C. M., & van der Vleuten, E. (2022). Historicising Entanglements: Science, Technology and Socio-Ecological Change in the Postcolonial Anthropocene. *Global Environment*, 15(2), 195-208.
- Den Boer, A. et al. (2021). Research and Innovation as a Catalyst for Food System Transformation. *Trends in Food Science & Technology* 107: 150–56.
- Divall, Co. et al. (2017), *Transport policy: Learning lessons from history* (Farnham: Taylor and Francis).
- Du Bois, C. M. (2018). *The story of soy* (Reaktion Books).
- Elliott, A., Cullis, J., & Damodaran, V. (2017). *Climate change and the humanities* (Palgrave Macmillan).
- Emanuel, M et al. (eds.) (2020). A U-turn to the Future: Sustainable Urban Mobility since 1850 (Berghahn).
- Epple, A. (2018.) Calling for a Practice Turn in Global History. *History and Theory* 57 (3): 390–407.

- Escobar A., "Sustaining the Pluriverse: The Political Ontology of Territorial Struggles in Latin America", in: Brightman & Lewis J. (eds), *The Anthropology of Sustainability* (Palgrave Macmillan 2017).
- Fazey, I. et al. (2018). 'Ten Essentials for Action-Oriented and Second Order Energy Transitions, Transformations and Climate Change Research'. *Energy Research & Social Science* 40: 54–70.
- Fazey, I. et al. (2020). Transforming Knowledge Systems for Life on Earth. *Energy Research & Social Science* 70.
- Flowerdew, J. (2012). *Critical Discourse Analysis in Historiography. The Case of Hong Kong's Political Identity* (Palgrave).
- Fransman, J. (2018). Charting a Course to "Research Engagement Studies." *Research for All* 2.2 195–229.
- Gómes-Baggethun, E. (2019). Sustainable Development. In: *Pluriverse. A post-development dictionary*, eds. A. Kothari et al. (New Delhi: Tulika Books), 71-73.
- Grober, U. (2012). *Sustainability: A cultural history* (Cambridge: Green Books).
- Haalboom, A. F. (2017). *Negotiating zoonoses: Dealings with infectious diseases shared by humans and livestock in the Netherlands (1898-2001)* (Dissertation, Utrecht University).
- Haalboom, F. (2021). Oceans and Landless Farms: Linking Southern and Northern Shadow Places of Industrial Livestock (1954–1975). *Environment and History*.
- Hecht, G. (2012). *Being nuclear: Africans and the global uranium trade* (Cambridge MA: MIT Press).
- Heymann, M. et al. (2020). Challenging Europe: Technology, Environment, and the Quest for Resource Security. *Technology and Culture* 61:1, 282-294.
- Hirsh, R., Jones (2014). History's contributions to energy research & policy. *Energy Research & Social Science* 1:106-111.
- Holbrook, C., & Lowe, D. (2021). Can historians influence public policy? *History Australia*, 18(1), 3-22.
- Hollander, A. (2012). *De geschiedenis van de biologische landbouw en voeding in Nederland* (Utrecht University).
- Jensen, J.S., M. Cashmore, P. Späth (eds.) (2018). *The Politics of Urban Sustainability Transitions* (Routledge).
- Jóhannesson, I. Á. (2010). The politics of historical discourse analysis: A qualitative research method? *Discourse: Studies in the cultural politics of education* 31(2): 251-264.
- Johnson, A. (2022). Europe without Borders: Environmental and Global History in a World after Continents. *Contemporary European History* 31(1): 129-141.
- Kalmbach, K. et al. (2020). Crises and technological futures: Experiences, emotion, and action. *Technology and Culture*, 61(1), 272-281.
- Knudsen, A. C. L., Gram-Skjoldager, K. (2014). Historiography and narration in transnational history. *Journal of Global History*, 9(1), 143-161.
- Kok, K. P., Gjefsen, M. D., Regeer, B. J., & Broerse, J. E. (2021). Unraveling the politics of 'doing inclusion' in transdisciplinarity for sustainable transformation. *Sustainability Science*, 16(6), 1811-1826.
- Kok, K. et al. (under review). Governing Translocal Experimentation for Sustainability Transitions'. *Environmental Innovation and Societal Transitions*
- Köhler, J. et al. (2019). An Agenda for Sustainability Transitions Research. *EIST* 31:1–32.
- Lang, D. (2012). Transdisciplinary Research in Sustainability Science. *Sustainability Science* 7(1): 25–43.
- Langthaler, E. (2018). The Soy paradox: The Western nutrition transition revisited. *Global Environment* 11 (1): 79-104.
- Langthaler, E. (2020). Broadening and Deepening: Soy Expansions in a World-Historical Perspective, *Historia Ambiental Latinoamericana y Caribeña* 10.2: 244-277.
- Lintsen, H. et al., (2018). *Well-being, Sustainability and Social Development. The Netherlands 1850-2050* (Springer).
- Loeber, A. et al. (2007). The Practical Value of Theory. In: A. Wals et al. (eds) *Social Learning towards a Sustainable World: Principles, Perspectives, and Praxis*, 83–98 (Wageningen Academic Publishers)
- Mach, K. et al. (2020). Actionable Knowledge and the Art of Engagement. *Current Opinion in Environmental Sustainability* 42: 30–37.
- Marques, L. (2021). Commodity chains and the global environmental history of the colonial Americas. *Esboços: histórias em contextos globais* 28(49): 640-697.
- Moss, T., & Weber, H. (2021). Technik-und Umweltgeschichte als Usable Pasts. *Technikgeschichte* 88(4), 367-378.

- Nowotny, H. et al. (2003). Introduction: "Mode 2" Revisited. *Minerva* 41(3): 179–94.
- O’Gorman, E., & Gaynor, A. (2020). More-than-human histories. *Environmental History* 25, 711-735.
- Potter, P. et al. (2010). Characterizing the spatial patterns of global fertilizer application and manure production. *Earth interactions* 14.2: 1-22.
- Prodöhl, I. (2013). Versatile and Cheap: A Global History of Soy in the First Half of the Twentieth Century. *Journal of Global History* 8: 461–82.
- Ross C. (2017). *Ecology and Power in the Age of Empire* (Oxford: Oxford University Press).
- Rubio-Varas, M. et al. (2021). *Engaging the Atom: The History of Nuclear Energy and Society in Europe from the 1950s to the Present* (West Virginia University Press).
- Schaffer, S. (2016). Origins and Barriers: Reflections on Subrahmanyam. *Modern Asian Studies* 50.1: 52-60.
- Schleper, S. (2019). *Planning for the planet: environmental expertise and the international union for conservation of nature and natural resources, 1960–1980* (Berghahn Books).
- Schuijjer, J. et al. (2022). Participation Brokers in the Making. *Journal of Science Communication* 21 (1): A01.
- Shurtleff W., A. Aoyagi (2009). *History of soybeans and soyfoods in South America (1882-2009): extensively annotated bibliography and sourcebook* (Lafayette, CA: Soyinfo Center)
- Shurtleff, W., A. Aoyagi (2015). *History of soybeans and soyfoods In the Netherlands, Belgium and Luxembourg (1647-2015). Extensively annotated Bibliography and sourcebook* (Lafayette, CA: Soyinfo Center).
- Smit, M. (2018). *De duurzaamheid van de Nederlandse landbouw 1950–2015–2040* (dissertation, WUR).
- Subrahmanyam, S. (1997). Connected histories: notes towards a reconfiguration of early modern Eurasia. *Modern Asian Studies* 31.3: 735-762
- Subrahmanyam, S. (2017). *Europe’s India: Words, People, Empires, 1500-1800* (Harvard University Press).
- Tosh, J. (2014). Public history, civic engagement and the historical profession in Britain. *History* 99 (335), 191-212.
- Turnhout, E. et al. (2020). The Politics of Co-Production. *Current Opinion in Environmental Sustainability* 42: 15–21.
- Van der Vleuten, E, T. Feys (2016). "Borders and Frontiers in Global and Transnational History", *Journal of Modern European History* 14.1: 29-34.
- Van der Vleuten, E., E. De Hoop (2022). Crisis narratives from the Dutch Soyacene: Regional sustainability histories at sites of soy consumption. In: Da Silva et al. (eds.), *The Age of Soybean* (White Horse Press): 265-288.
- Van Mierlo, B. et al. (2010). *Reflexive monitoring in action. A guide* (WUR/VU).
- Verdonk, D.J. (2009). *Het Dierloze Gerecht. Een vegetarische geschiedenis van Nederland* (Amsterdam: Boom).
- Vijver, M. (2005). *Protein politics* (dissertation, University of Twente).
- Voß, JP, R. Freeman (eds.) (2016). *Knowing governance: the epistemic construction of political order* (Springer).
- Warde, P. (2018). *The Invention of sustainability: Nature and destiny* (Cambridge University Press, 2018)
- Wenzhuemer, R. (2020). *Doing Global History: An Introduction in 6 Concepts* (Bloomsbury Publishing).
- Weis, T. (2013). *The ecological hoofprint: The global burden of industrial livestock* (Bloomsbury Publishing).
- Zuiderent-Jerak, T. (2015). *Situated Intervention: Sociological Experiments in Healthcare* (MIT Press).