Update on Component 1

April 2018

Jill Baron and Hans van Grinsven

Wilfried Winiwarter, Christopher Clark, Hideaki Shibata, Bill Bealey, Kevin Hicks, Baojing Gu, Wim de Vries, Claudia Cordovil, Cargele Masso

Component 1
Tools for understanding & managing the global N cycle *Baron / van Grinsven*

Activity 1.1
Devlpt of N system indicators
Winiwarter / Clark

Activity 1.2
Devlpt of N threat assessment methodology
Baron / Shibata

Activity 1.3
Devlpt methodology N fluxes and distribution

Activity 1.4
Devlpt approaches N threat-benefit valuation
Van Grinsven / Baojing Gu

Activity 1.5
Flux-impact models for assessm., scenarios
(de Vries / Winiwarter)

Activity 1.6
Examination barriers to better N managemnt
Masso/Cordovil

Summary of progress

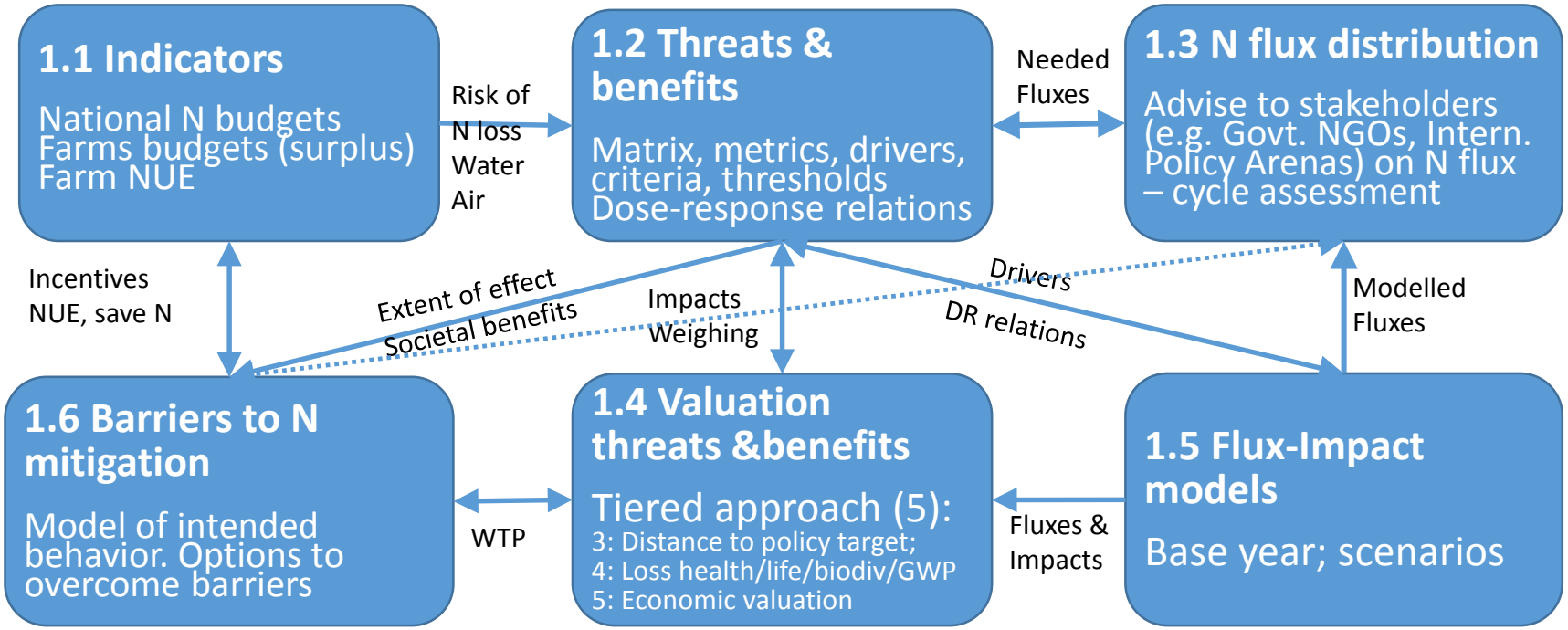
- Teams formed
- Work plans written
- First deliverables
- Report outlines
- Different speeds
- Some tuning issues
- No contracts
- Some delays

Output, outcome, resources and challenges

- Review, report current methods
- Achieve global coverage and engagement
- 90% based on available material from “in kind” contributions
- Build new networks
- Attractive for scientific institutes and careers

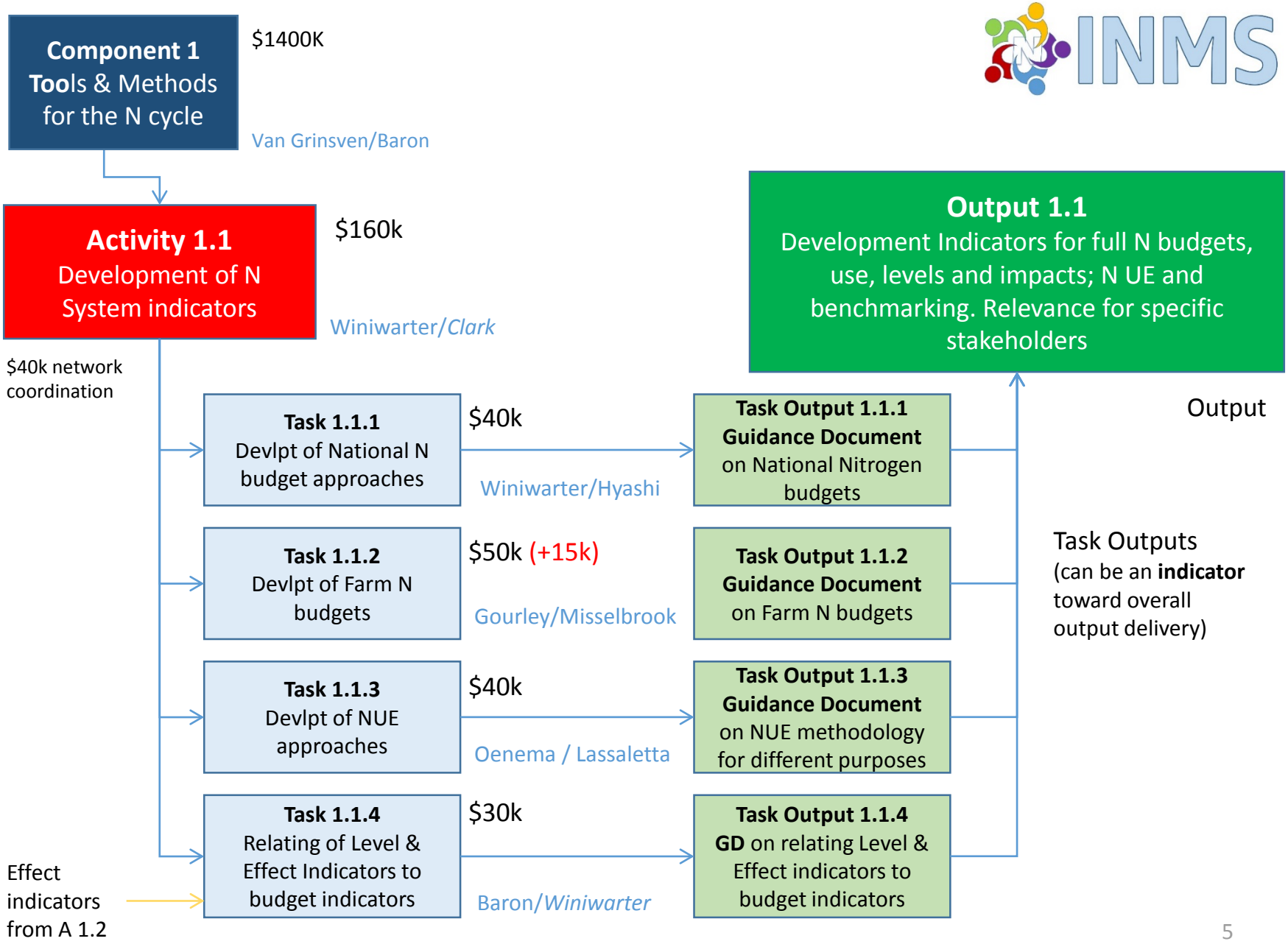
- Agreed and applied INMS based N policy decision

C1 – Linkage and interaction



- Methodology and delivery for C2 and C3
- Global coverage, stakeholder interaction

Activity 1.1


Component 1
Tools & Methods for the N cycle
$1400K
Van Grinsven/Baron
Activity 1.1
Development of N System indicators
$160k
Winiwarter/*Clark*
$40k network coordination
Output 1.1
Development Indicators for full N budgets, use, levels and impacts; N UE and benchmarking. Relevance for specific stakeholders
Output
Task 1.1.1
Devlpt of National N budget approaches
$40k
Winiwarter/Hyashi
Task Output 1.1.1
Guidance Document on National Nitrogen budgets
Task 1.1.2
Devlpt of Farm N budgets
$50k (+15k)
Gourley/Misselbrook
Task Output 1.1.2
Guidance Document on Farm N budgets
Task 1.1.3
Devlpt of NUE approaches
$40k
Oenema / Lassaletta
Task Output 1.1.3
Guidance Document on NUE methodology for different purposes
Task 1.1.4
Relating of Level & Effect Indicators to budget indicators
$30k
Baron/*Winiwarter*
Task Output 1.1.4
GD on relating Level & Effect indicators to budget indicators
Task Outputs
(can be an indicator toward overall output delivery)
Effect indicators from A 1.2

Activity 1.1: Development of N System indicators	17	2018				2019				2020				2021		
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Task 1.1.1 Development of National N budget approaches	W W		M				M				M		R		M		
Task 1.1.2 Development of Farm N budgets			M				M				M		R				
Task 1.1.3 Development of NUE approaches			M				M				M R						
Task 1.1.4 Relating of Level & Effect Indicators to budget indicators			M								M				M R		
Monitoring and Evaluation						R				R				R			R

T1.1.1 Guidance Document on National Nitrogen budgets

- Co-ordinated activities in the UN-ECE
- Japan: Kentaro Hayashi
- China / Australia: Baojing Gu
- USA: Chris Clark
- Initial workplan drafted, but up for revision (here in Edinburgh)
- UNECE GD on national N budgets starts to beome operative (Berlin, May 2-3, 2018)
- Upcoming meeting (tbd): EPNB (October)
  East-Asia INMS (November)

Task 1.1.2: Development of farm nitrogen budgets – dairy systems

What are the key N performance indicators that inform and improve N management decisions and reduce N losses for intensifying dairy systems, and how should these be estimated?

Current International Project team (12 countries, 8 dairy production systems)

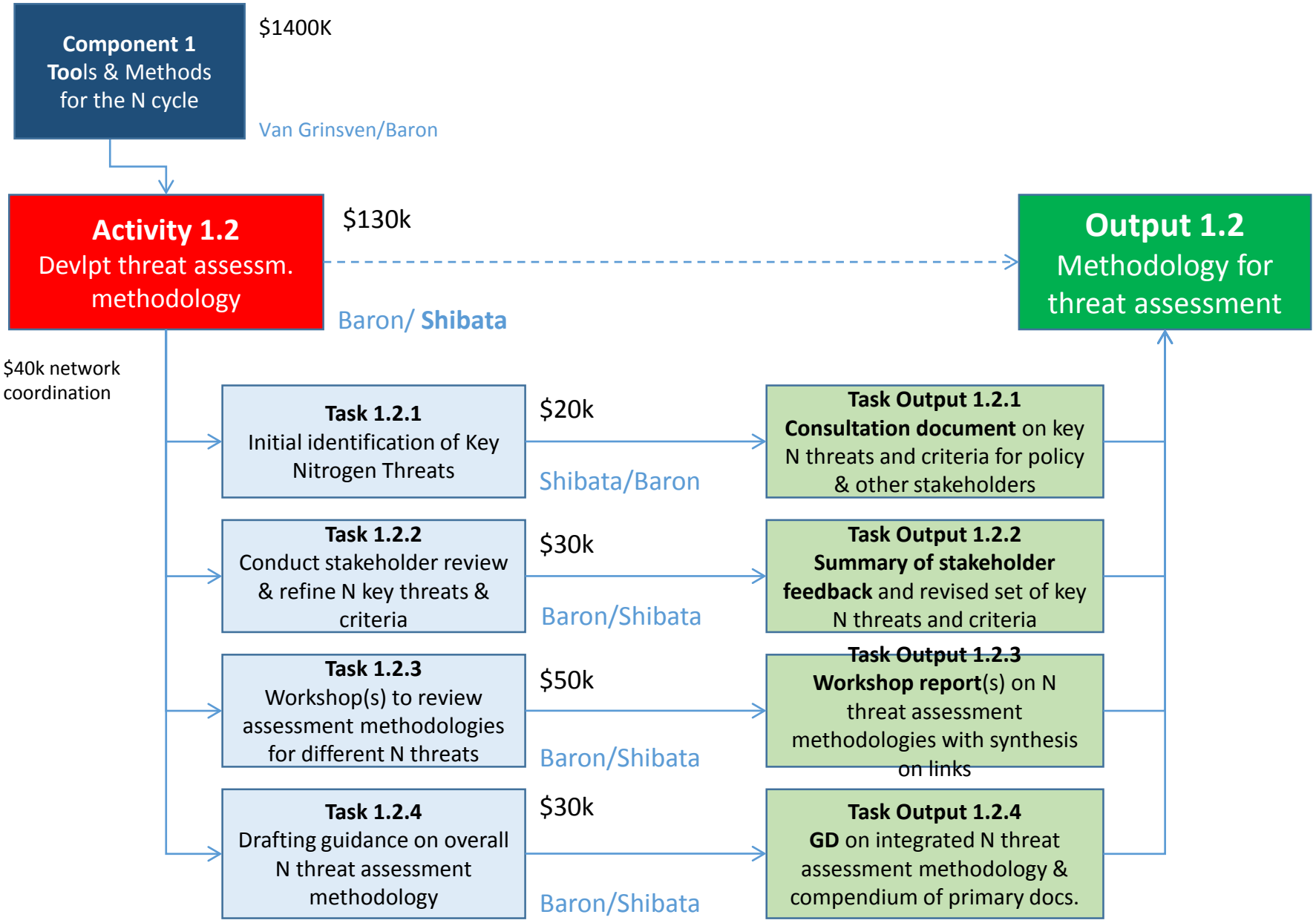
- Cameron Gourley (Joint Task Leader), Agriculture Victoria, Australia.
- Tom Misselbrook (Joint Task Leader), Rothamsted Research, UK.
- Nick Hutchings; Tommy Dalgraad, Arhus University DK
- Cláudia Marques-dos-Santos Cordovil, DCEB, Portugal
- Shabtai Bitman, Agriculture and Food Canada
- Marta Alfaro, INIA, Chile.
- Yoshitaka Uchida, Hokkaido University Japan
- Karl Richards, Teagasc, Johnstown Castle, Wexford. Ireland
- Cecile de Klein; Mark Shepherd, AgResearch, New Zealand
- Sharon Aarons, Agriculture Victoria, Australia
- John Lory, University of Missouri
- Karin Groenestein, Wageningen UR, The Netherlands
- Lin Ma, The Chinese Academy of Sciences, China

T1.1.2 Proposed approach:

1. Share international expertise, knowledge and tools
2. Develop appropriate indicators for practical application to grazing-based dairy farming systems.
3. 2 regional workshops (Dec 2018, Dec 2019), where we engage with farmers, industry and policy groups
4. Capitalise on existing datasets available internationally to develop and test our set of indicators.

Date	Activity	Responsible
July 2018	Drafting structure of guidelines document and outline of regional workshops.	Cameron and Tom with input from team
December 2018	First Workshop (Melbourne Australia) Proposed: week 3 - 8th Dec 2018	Team
July 2019	Draft version of guidelines document and proposed methods. Selection of case studies. Drafting outline of journal paper. Selection of case studies. Drafting outline of journal paper.	Cameron and Tom with input from team
December 2019	Second Workshop (tbd, but potentially China or Portugal). Revised version of guidelines. Case study assessments completed. Draft of journal paper.	Team
July 2020	Finalized guidelines including case studies reported and completed. Journal paper submitted	Cameron and Tom with input from team

Activity 1.2


Component 1
Tools & Methods for the N cycle
$1400K
Van Grinsven/Baron
Activity 1.2
Devlpt threat assessm. methodology
$130k
Baron/ Shibata
Output 1.2
Methodology for threat assessment
$40k network coordination
Task 1.2.1
Initial identification of Key Nitrogen Threats
$20k
Shibata/Baron
Task Output 1.2.1
Consultation document on key N threats and criteria for policy & other stakeholders
Task 1.2.2
Conduct stakeholder review & refine N key threats & criteria
$30k
Baron/Shibata
Task Output 1.2.2
Summary of stakeholder feedback and revised set of key N threats and criteria
Task 1.2.3
Workshop(s) to review assessment methodologies for different N threats
$50k
Baron/Shibata
Task Output 1.2.3
Workshop report(s) on N threat assessment methodologies with synthesis on links
Task 1.2.4
Drafting guidance on overall N threat assessment methodology
$30k
Baron/Shibata
Task Output 1.2.4
GD on integrated N threat assessment methodology & compendium of primary docs.

Activity 1.2 Development of threat assessment methodology	17	2018				2019				2020				2021		
		Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3
Task 1.2.1: **Initial Identification of Key N threats**			R														
Task 1.2.2 **Conduct stakeholder review;** **refine key N threats and criteria**					R												
Task 1.2.3 **Workshop to review assessment methodologies for N threats**									W								
Task 1.2.4 **Draft guidance on overall N threat assessment methodology**													R				
Monitoring and Evaluation						R				R				R			

INMS activity 1.2 Core Team

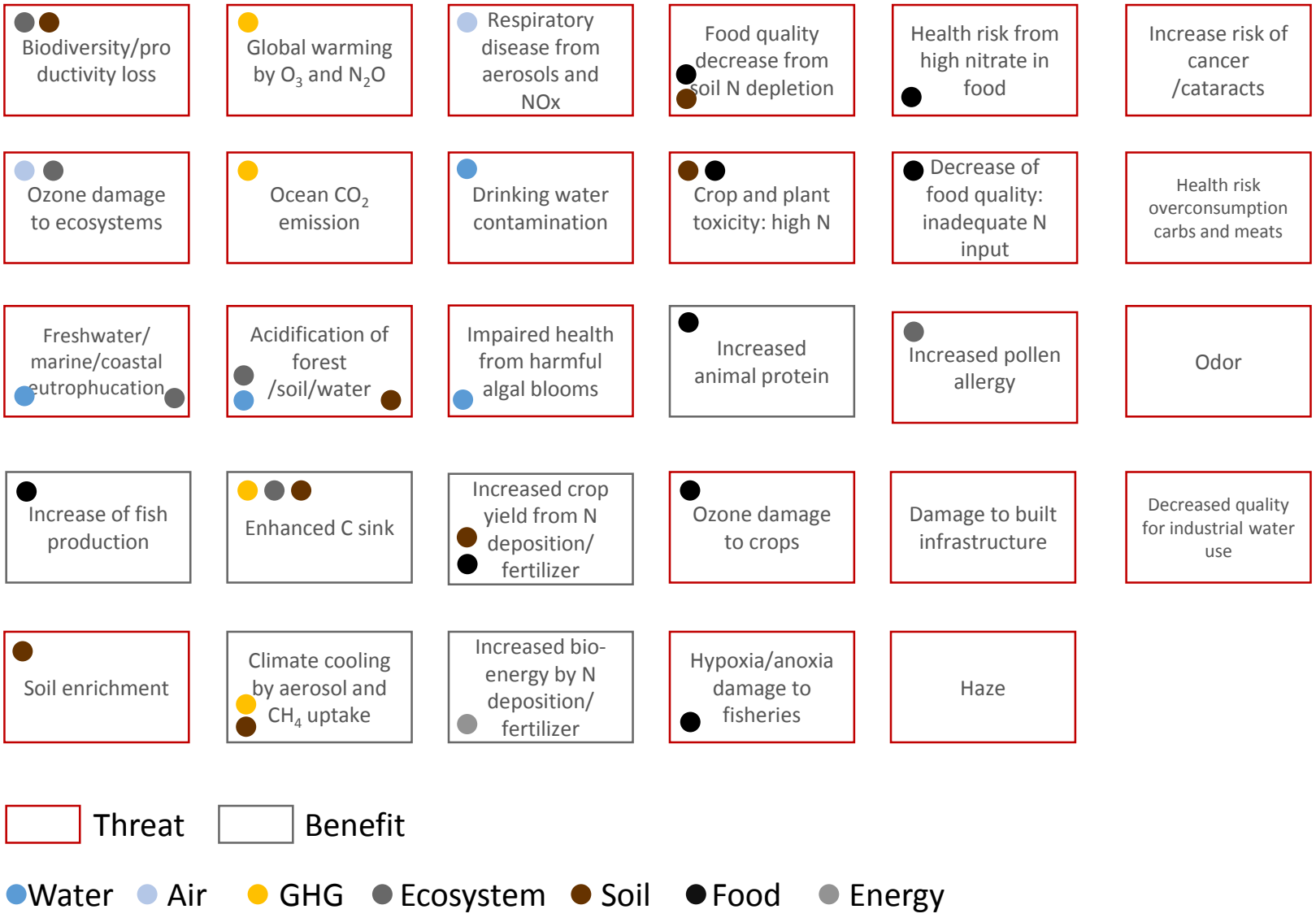
Name	Affiliation	Expertise/Role
Hideaki Shibata	Japan	Ecosystem ecology, Co-Lead
Jill Baron	USA	Ecosystem/freshwater ecology, Co-Lead
Timothy Weinmann	USA	Biogeochemistry, support
Azusa Oita	Japan	Nitrogen valuation, support
Ming-Chien Su	Taiwan	Air and water quality, agriculture
Jason Holt	UK	Marine N cycling and threats
Adrianna Flores	Mexico	Water quality
Peter Groffman	USA	Ecosystem ecology, biogeochemistry
Wim de Vries	Netherlands	Nitrogen cycling and biogeochemistry
Mark Sutton	UK	Threats, benefits

10 core members (44 collaborators); multidisciplinary; 6 countries; 40% women;

Matrix of N threat-benefit

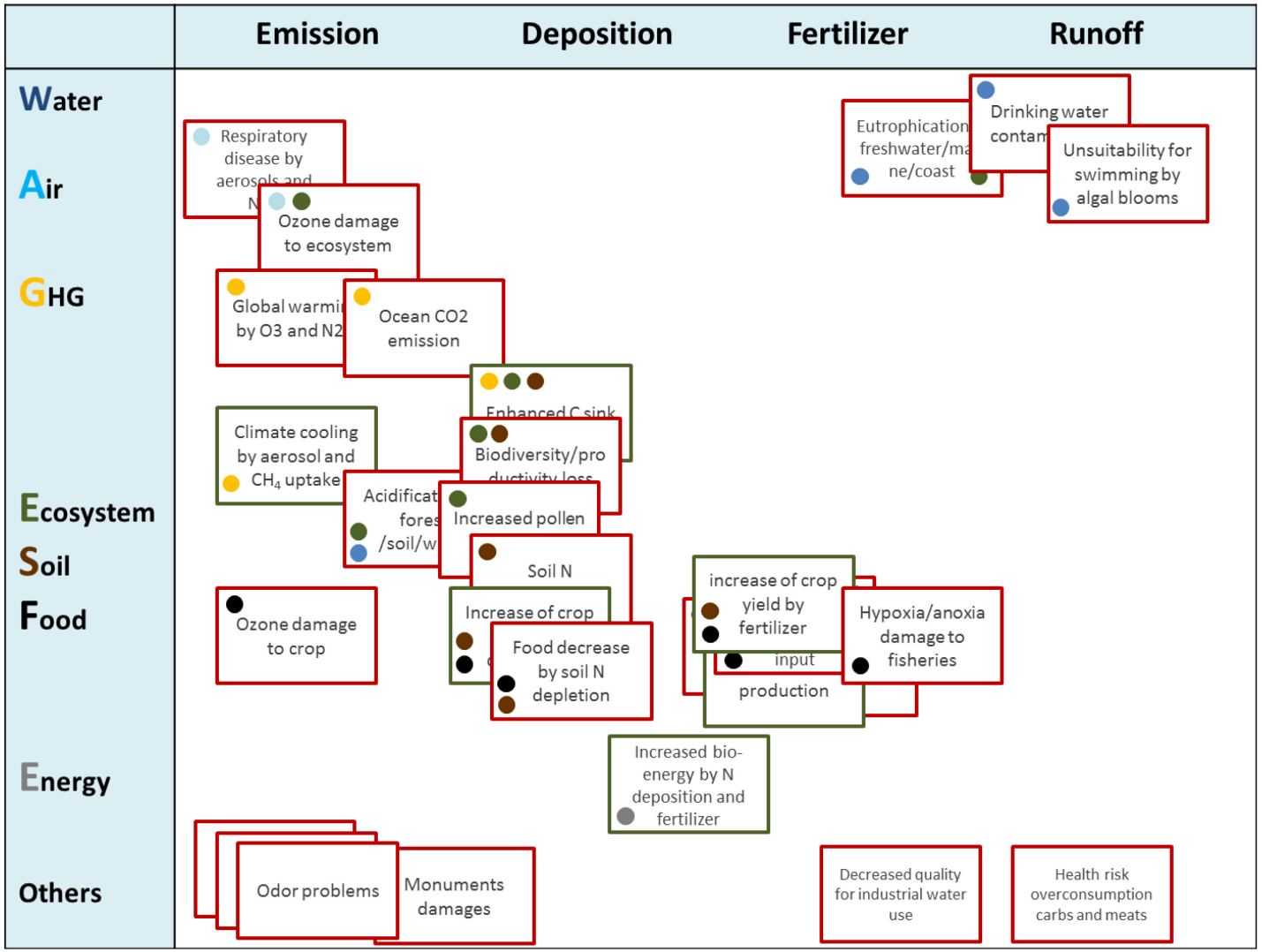
ID	Short_name	Threat_Benefit_description	Direct impact	Threat/ Benefit	Cluster: WAGES-FE	Threat metric	Indicator (Status)	Link to Nr cascade (Pressures)	Global scale derivation
1	Biodiversity/productivity loss	Eutrophication effects on productivity and biodiversity in terrestrial ecosystems (incl. Pests and diseases)	Ecosystem	T	Ecosystem Soil	Growth reduction Occurrence of lichen and moss Biodiversity index	Critical load of atmospheric N deposition (nature) Critical level of NH3	N deposition	IMAGE-GLOBIO; based on D-R relationships SMB model; to be applied globally
2	Ozone damage to ecosystem	Ozone damage to forests, and natural ecosystems	Ecosystem	T	Ecosystem Air	Growth reduction	POD1 (forests) POD6 (vegetation) AOT40, WSL 126	NOx emission	EMEP-Global plus D-R relationships; Currently no DGVM involved with this effect
3	Eutrophication in freshwater	Eutrophication of freshwaters, lakes including hypoxia/anoxia (incl. Biodiversity)	Ecosystem	T	Ecosystem Water	Chlorophyll Macrophytes Macrofauna Fish	BOD NO3 Critical loads (nature)	N-Runoff N deposition	IMAGE-GLOBIO-aquatic based on D-R relationships IMAGE-GNM and Global NEWS (partly)
4	Eutrophication in marine/coast	Eutrophication of coastal ecosystems inducing hypoxia/anoxia (incl. Biodiversity)	Ecosystem	T	Ecosystem Water	Chlorophyll Macrophytes Macrofauna Fish	BOD NO3 Critical N inputs (agriculture) Dissolved O2 Algal taxonomy Shellfish closures	N-Runoff N deposition	D-R relationships? Discussion
5	Soil N enrichment	N enrichment in soil	Ecosystem	T	Soil	Biodiversity Soil fauna Winter N loss	N and C concentrations C:N ratios	N deposition	VSD/RothC model; to be applied globally LPJ or EPIC Crop growth models; D-R relationships
6	Global warming by N2O	Global climate warming induced by emission of N2O or carbon cycle changes (CO2 and NH4) induced by excess nitrogen	Ecosystem Human	T	Greenhouse gas	GWP of additional N2O	N2O CH4 CO2	N2O (dir, indir) emission	A2.1; IMAGE, GLOBIOM, MAgPIE, MITERRA etc.
7	Global warming by O3	Warming caused by Nr contribution to tropospheric ozone, and due to organic aerosols	Ecosystem Human	T	Greenhouse gas	Change of GWP	NOx N2O Organic aerosol	NOx and N2O emissions	Currently no DGVM involved which quantifies O3 effect; D-R relationships
8	Ocean CO2 emission	CO2 emission by acidification of oceans	Ecosystem Human	T	Greenhouse gas	Change of GWP due to CO2 emission	NOx HNO3 NH4+ N2O	NOx and N2O emissions N deposition	D-R relationships? Discussion
9	Acidification of forest/soil/water	Acidification effects on forests, soils, ground waters, and aquatic ecosystems. Incl. Degradation of coral reefs decreasing coastal protection	Ecosystem Human	T	Ecosystem Water Soil	Grown reduction	Critical load of atmospheric N & S deposition Al (and heavy metal) concentrations in soil	N deposition	SMB model; to be applied globally
10	Enhanced C sink	Enhanced carbon sequestration (plant and soil) in natural systems by N deposition	Ecosystem Human	B	Greenhouse gas Ecosystem Soil	Change of GWP due to CO2 capturing	C stocks NEP	N deposition	LPJ?; D-R relationships
11	Climate cooling by aerosol	Regional climate cooling induced by aerosol	Ecosystem Human	B	Greenhouse gas	Change of GWP	PM2.5	NOx and NH3 emission	IMAGE? D-R relationships?
12	Climate cooling by low CH4	Net cooling effect of Nr by reduction of atmospheric CH4 life time and increased soil CH4 uptake	Ecosystem Human	B	Greenhouse gas Soil	Change of GWP	CH4 O3 N deposition	NOx deposition N deposition	D-R relationships? Discussion
13	Respiratory disease by aerosols	Respiratory disease and cancers in people caused by exposure to high concentrations of fine particles including ammonium and nitrate aerosols	Human	T	Air	% people exposed to > threshold Increased incidence of disease	PM10 PM2.5 NH3 Particulate NH4	NOx and NH3 emission	D-R relationships? Discussion

29 items have been identified.



Mapping of the N threat-benefit items

Links to nitrogen cascades



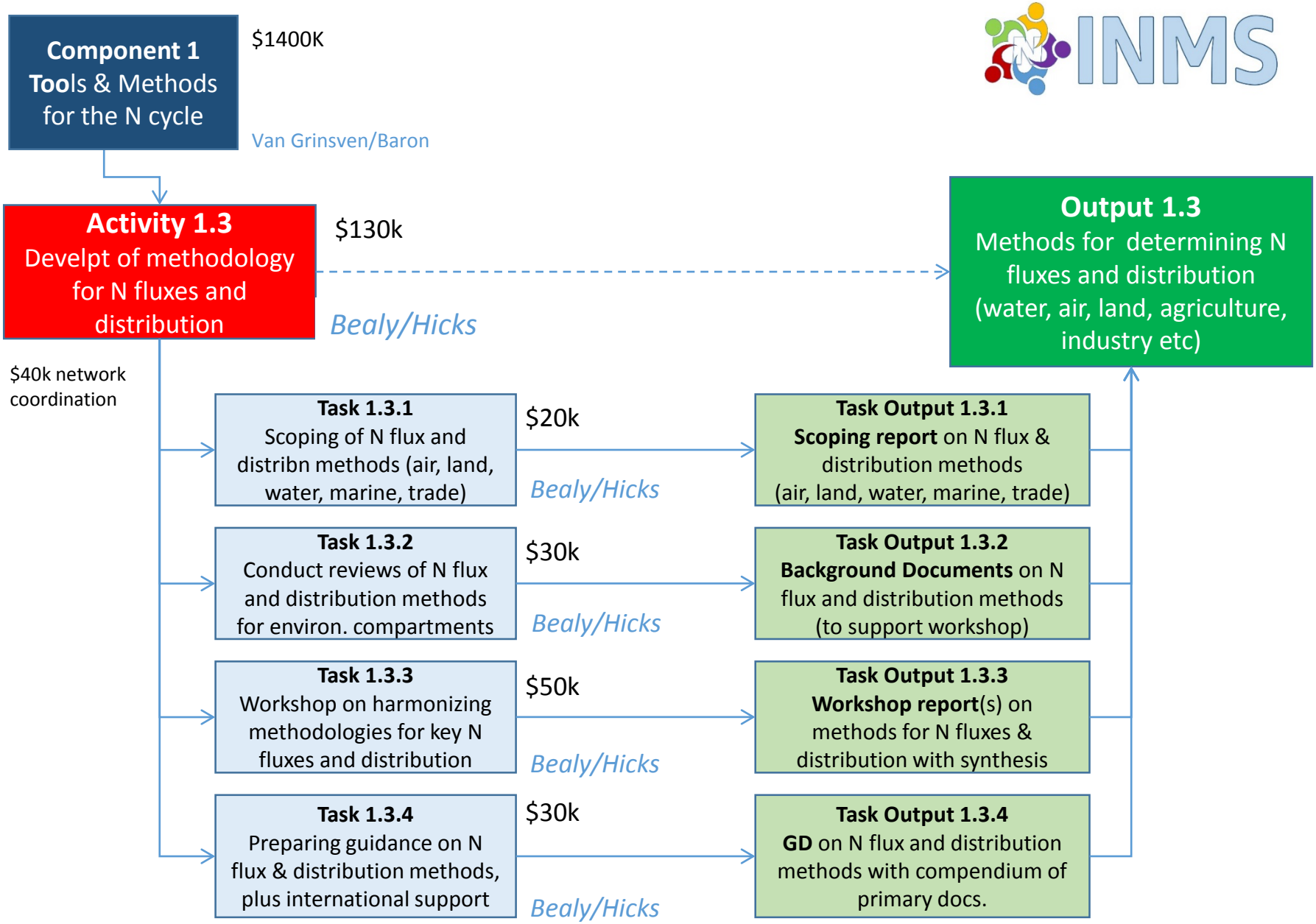
Threat Benefit Water Air GHG Ecosystem Soil Food Energy

Progress and plans

- Workplan ready
- Threat-Benefit matrix (xls)
- Outline Guidance document
- Joint 1.2-1.4 workshop in Fort Collins (Sept. 10-13)
  - Adopt existing or new metrics

Activity 1.2 Development of threat assessment methodology	17	2018				2019				2020				2021		
		Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3
Task 1.2.1: **Initial Identification of Key N threats**			R	M	R												
Task 1.2.2 **Conduct stakeholder review;** **refine key N threats and criteria**					R		R										
Task 1.2.3 **Workshop to review assessment methodologies for N threats**					W				W								
Task 1.2.4 **Draft guidance on overall N threat assessment methodology**													R				
Monitoring and Evaluation						R				R				R			

Activity 1.3


Component 1
Tools & Methods for the N cycle
$1400K
Van Grinsven/Baron
Activity 1.3
Develpt of methodology for N fluxes and distribution
$130k
Bealy/Hicks
Output 1.3
Methods for determining N fluxes and distribution (water, air, land, agriculture, industry etc)
$40k network coordination
Task 1.3.1
Scoping of N flux and distribn methods (air, land, water, marine, trade)
$20k
Bealy/Hicks
Task Output 1.3.1
Scoping report on N flux & distribution methods (air, land, water, marine, trade)
Task 1.3.2
Conduct reviews of N flux and distribution methods for environ. compartments
$30k
Bealy/Hicks
Task Output 1.3.2
Background Documents on N flux and distribution methods (to support workshop)
Task 1.3.3
Workshop on harmonizing methodologies for key N fluxes and distribution
$50k
Bealy/Hicks
Task Output 1.3.3
Workshop report(s) on methods for N fluxes & distribution with synthesis
Task 1.3.4
Preparing guidance on N flux & distribution methods, plus international support
$30k
Bealy/Hicks
Task Output 1.3.4
GD on N flux and distribution methods with compendium of primary docs.

Activity 1.3 Development of methodology for N fluxes and distribution	17	2018				2019				2020				2021		
		Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3
Task 1.3.1 Scoping of N flux and distribution methods (air, land, water, marine, trade)				R													
Task 1.3.2 Conduct reviews of N flux and distribution methods for environ. compartments								R									
Task 1.3.3 Workshop on harmonizing methodologies for key N fluxes and distribution										W							
Task 1.3.4 Preparing guidance on N flux & distribution methods, plus international support														R			
Monitoring and Evaluation						R				R				R			R

Activity 1.3 Storyline

- "Development of the methodology for combined assessment of nitrogen fluxes and distribution considering the linkages between air, land and water and dispersion

Range of Methodologies?

- *Measurements*
- *Emission inventories -> models*
- *National datasets, census data, maps*
- *N-footprints?*

Consider data at different scales?

- *Plot/field*
- *Catchment*
- *Region*
- *Global*

Progress Q4-17; Q1-18

- Evora workshop Oct 2017
  - Clarify – redefine role of activity 1.3 within INMS
- **Outcome**: Develop guidance for government and international policy arena related stakeholders to inventory, monitor and model the key Nr fluxes
  - multiple methodologies at different scales
  - harmonize approaches
- Draft Core-team
- Draft workplan
- Draft Outline Scoping report (Tasks 1)

Online Knowledge System

Searchable tool for N flux methods across the N cycle

atmosphere	⇨	**Terrestrial**
atmosphere	⇨	**water body (e.g. marine, freshwater)**
fertilizer	⇨	**land**
water body	⇨	**atmosphere**
terrestrial	⇨	**atmosphere**
terrestrial	⇨	**water bodies**
linkages	⇨	**trade**

Method Datasheets

Method title

- Method description
- Usage of the method including any factors to consider
- Relevant compartment (air, land, water etc.)
- Key references and documents
- Relevant datasets and data centres

Tagged by keywords – e.g. pollutant type, geographical reach, compartment, units

INMS

Core team in prep

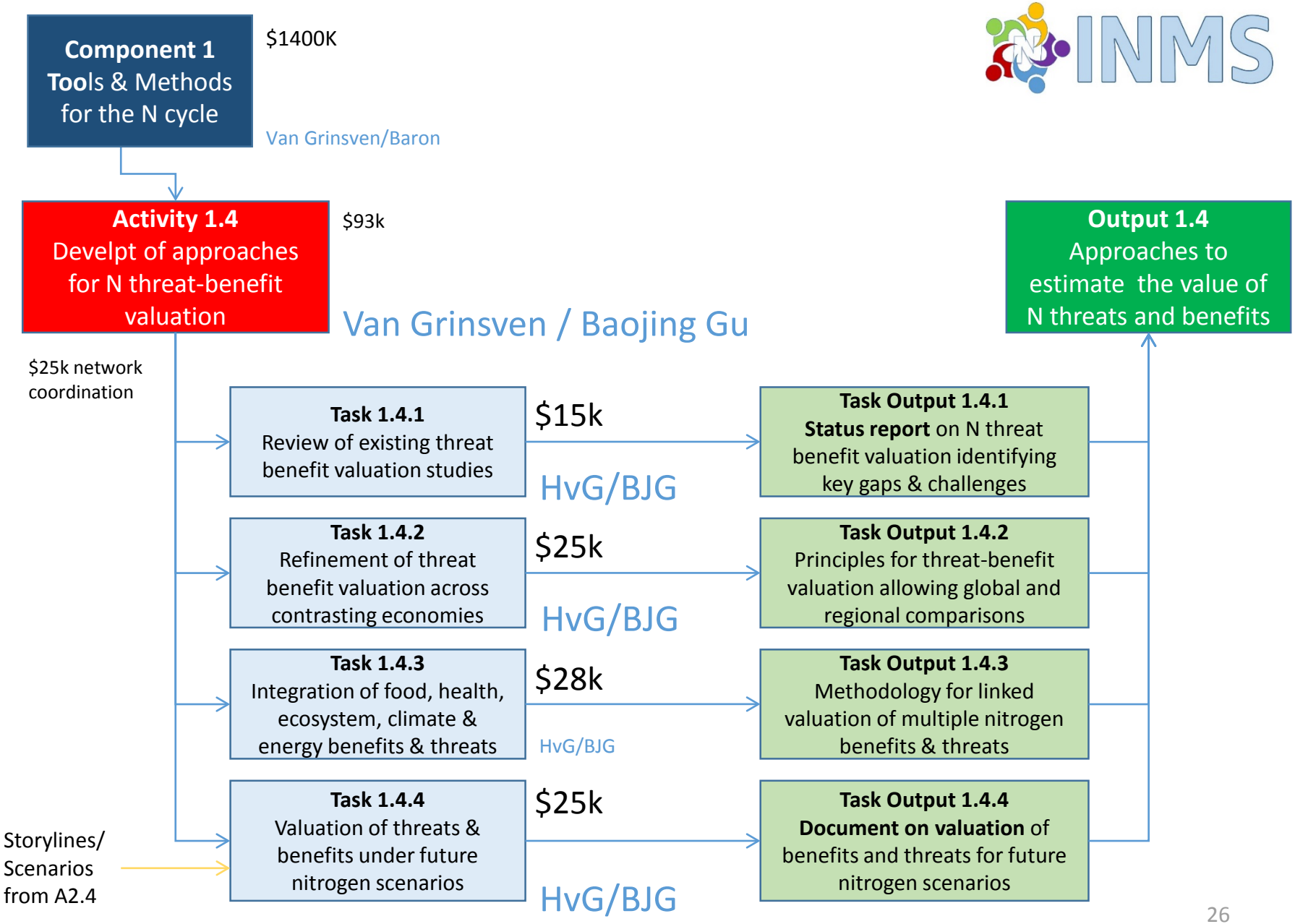
Addo van Pul, Roy Wichink Kruit, RIVM; the Netherlands
Alessandra De Marco, Giovanni Vialetto, Mihaela Mircea ; ENEA, Italy
Pascal Boeckx, Samuel Bodé; UGENT, Belgium
Pierre Cellier, Sylvain Pellerin, Philippe Hinsinger; INRA, France
Ying Zhang; Beijing Forestry University, China
Bruna Grizzetti, Adrian Leip; JRC, EC
Chris West, Jon Green; SEI, University of York
Jim Tang; Woods Hole, USA
Maren Voss; Leibniz Institute for Baltic Sea Research
Jan Willen Erisman, Vrije University Amsterdam
Maria do Rosário Cameira; University of Lisbon

…..*Southern hemisphere?*

Building team to cover different compartments, sectors, scales, regions, methodologies, users….?

Activity 1.3 Development of methodology for N fluxes and distribution	17	2018				2019				2020				2021		
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Task 1.3.1 Scoping of N flux and distribution methods (air, land, water, marine, trade)	W			~~R~~	R												
Task 1.3.2 Conduct reviews of N flux and distribution methods for environ. compartments								R									
Task 1.3.3 Workshop on harmonizing methodologies for key N fluxes and distribution										W							
Task 1.3.4 Preparing guidance on N flux & distribution methods, plus international support														R			
Monitoring and Evaluation						R				R				R			R

Activity 1.4


Component 1
Tools & Methods for the N cycle
$1400K
Van Grinsven/Baron
Activity 1.4
Develpt of approaches for N threat-benefit valuation
$93k
Van Grinsven / Baojing Gu
Output 1.4
Approaches to estimate the value of N threats and benefits
$25k network coordination
Task 1.4.1
Review of existing threat benefit valuation studies
$15k
HvG/BJG
Task Output 1.4.1
Status report on N threat benefit valuation identifying key gaps & challenges
Task 1.4.2
Refinement of threat benefit valuation across contrasting economies
$25k
HvG/BJG
Task Output 1.4.2
Principles for threat-benefit valuation allowing global and regional comparisons
Task 1.4.3
Integration of food, health, ecosystem, climate & energy benefits & threats
$28k
HvG/BJG
Task Output 1.4.3
Methodology for linked valuation of multiple nitrogen benefits & threats
Task 1.4.4
Valuation of threats & benefits under future nitrogen scenarios
$25k
HvG/BJG
Task Output 1.4.4
Document on valuation of benefits and threats for future nitrogen scenarios
Storylines/ Scenarios from A2.4

Application of N cost – benefit assessments

- "*trick*" to weigh and add up Nr emissions; External costing
- deal with multiple source-form-impact nature of N pollution
- N-CBA's published for EU, USA, India, China; (N cost 1-4% GDP)

Examples of application

1. Communicate relevance of N pollution – policy decision
2. Find optimum level of mitigation (incl. pollution swapping)
3. Find societal optimum level of N fertilization
4. Find optimum spatial configuration of N polluting activities
5. Translate external cost N pollution to price tag of diets / products

Activity 1.4: development of approaches for N threat-benefit valuation	17	2018				2019				2020				2021		
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Task 1.4.1 Review of existing threat benefit valuation studies				R													
Task 1.4.2 Refinement of threat benefit valuation across contrasting economies							R										
Task 1.4.3 Integration of food, health, ecosystem, climate & energy benefits & threats							M			R							
Task 1.4.4 Valuation of threats & benefits under future nitrogen scenarios															R		
Monitoring and Evaluation						R				R				R			R

Progress Q4-17; Q1-18

- Core-team; multidisciplenary; global coverage
  - Reluctance to accept responsibilities for tasks/report
- Agreed workplan
- Agreed Outline for Status Report (Tasks 1, 2 and 3)
  - Propose to write one report; with partial deliveries per task
  - Agreement on Joint high level paper with results 1.2&1.4
- First “In kind” and “In cash” contributions and new activities for global valuation
  - INPE-GPNM: CBA Case studie Pantanal Brasil (A1.4.2)
  - Univ Waterloo: Global Meta Analysis Aquatic impacts (1.4.3)
  - Zhejang Univ: China Framework paper (A1.4.3)
  - PBL: intern started CBA Lake Victoria Basin (A1.4.2)
- Cooperation and joint workshop with A1.2 in Fort Collins (Sept. 10-13)

INMS activity 1.4 Core team

Names	Region	Task and Expertise
• Baojing Gu	China	Co chair; integrated assessment
• Jane Compton •	USA	Ecosystem Service (ESS) valuation
• Roy Brouwer	Canada	Valuation theory, WTP surveys; meta analysis; valuation impacts water
• Berit Hasler • Heini Ahtiainen	Denmark Finland	Valuation Baltic (Marine); WTP surveys
• Hans van Grinsven	Netherlands	Chair: EU Cost Benefit; Unit cost method; Nitrate and health
• Arjan Ruijs	Netherlands	Environmental Economics; ESS valuation; CBA NEC
• Fredrick Mhina Mngube • Dieudonne Hatungimana	Africa	Demo Africa; Lake Victoria Basin. WTP Food security
• Felipe Pacheco • Jean Ometto	Brasil	Demo Latin America; Pantanal costing case study
• Biswajit Mondal • Tapan Adhyas	India	Demo South Asia; WTP Food security
• Niels-Axel Braathen	OECD	Health costs; valuation theory
• Mike Holland	UK-EU	ENA; ECLAIRE; Valuation EU health impacts, cost air pollution;
• Laurence Jones	UK-EU	ENA; ECLAIRE; Valuation impacts ESS and impacts terrestrial ecosystems
• Nicola Beaumont	UK-EU	Valuation of marine ESS
• Tai McClellan Maaz • Tom Bruulsma	IPNI	Benefits for agriculture and food

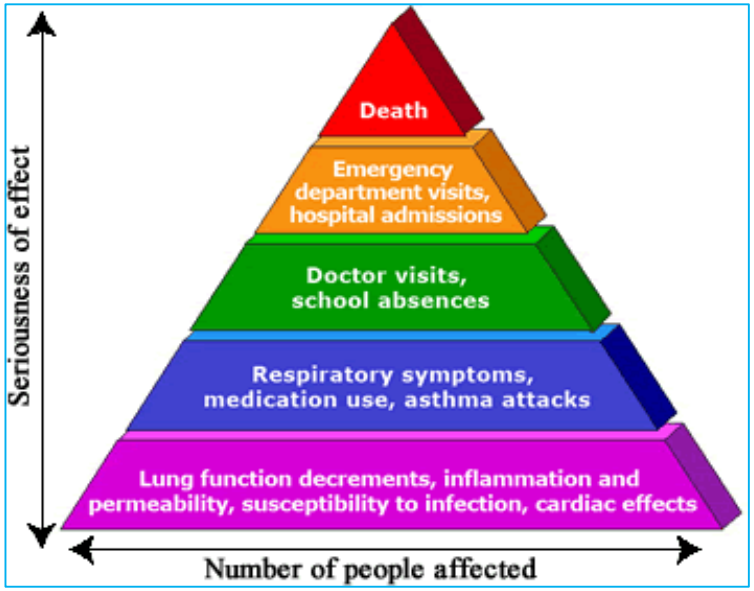
12 (+ 6) core members; multidisplinary; 5 continents; 13 male;

Impacts of nitrogen:
4 N compounds, 4 impact categories

	Human health	Ecosystems	Climate	Food
NOx-air				
NH_3-air				
N (NO_3)-water				
N_2O-air				
N-fertilizer				

Five Tier in A1.2-A1.5

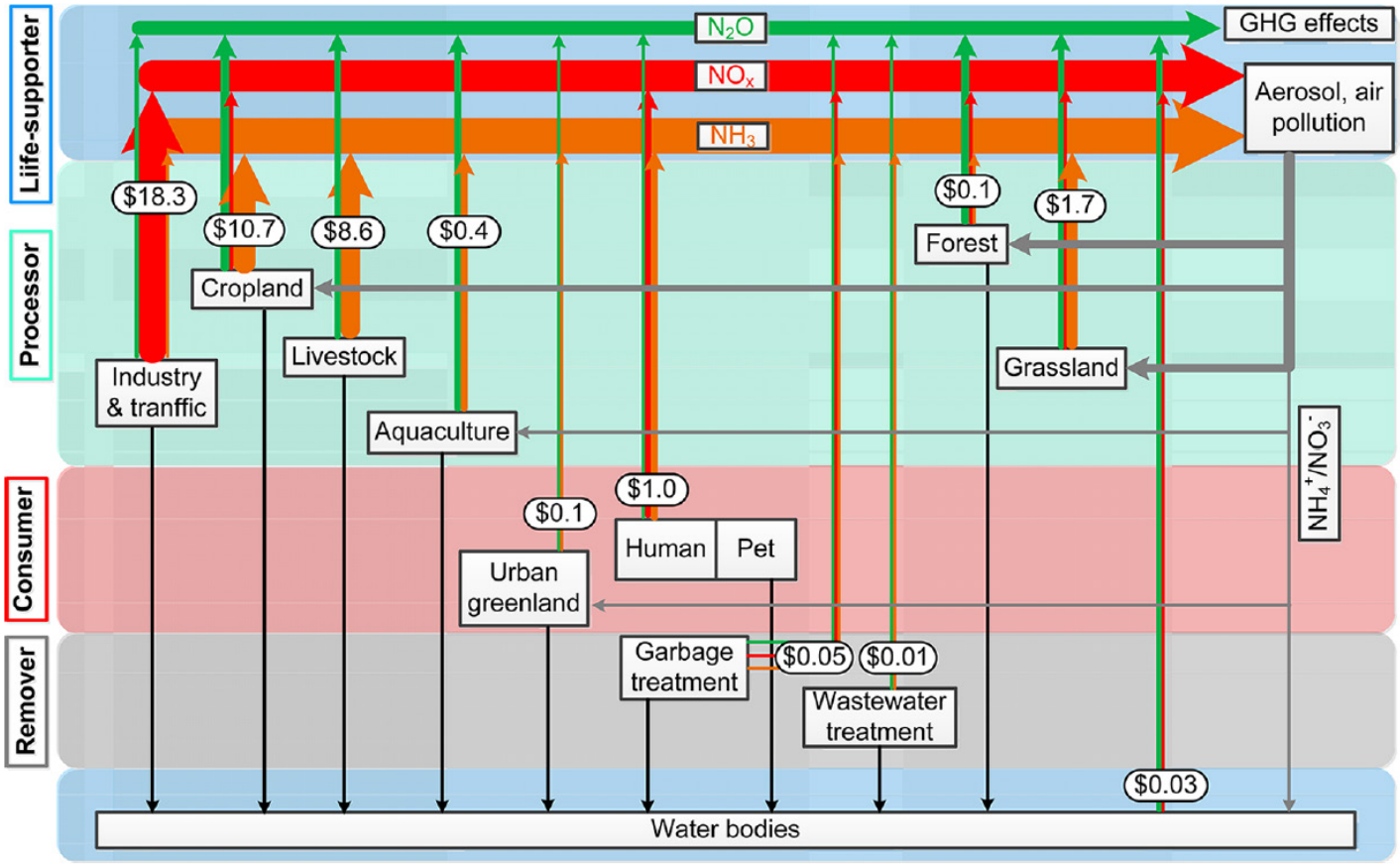
- Tier 4: Aggregated expression of N impacts
  - Health: Disability Adjusted Life Years (DALY);
  - Ecosystems: Mean Species Abundance (MSA), ESS, …;
  - Climate: Global Warming Potential (GWP);
  - Agro-Food benefits: TBD, ratio of supply/demand of calories or protein (Link to SDGs)
- Tier 5: express Tier 4 in "€$£¥":
  - communicates well but controversial



Pyramid of health impacts of air pollution

Cost of N in air pollution China 2008

- 19–62 billion USD/yr 0.4–1.4% of GDP
- 52–60% NH3 emission 39–47% NOx emission

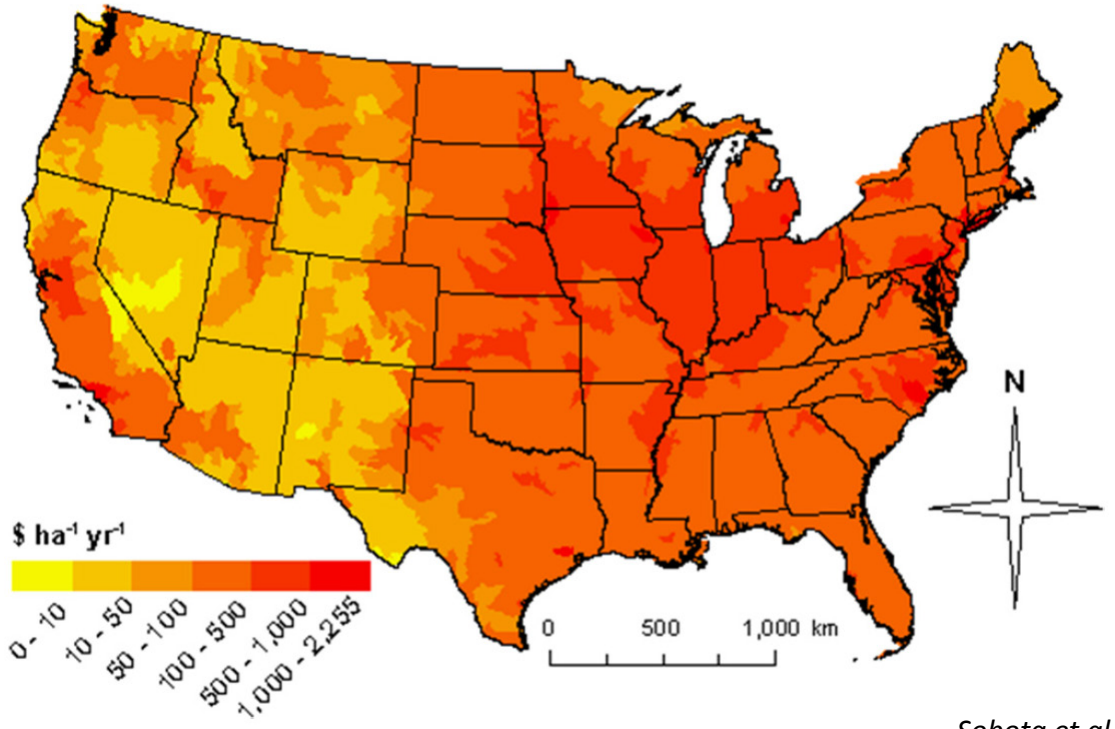


Gu et al 2012

Cost of N pollution USA around 2000

- 210 bio USD/yr (range 81–441
- 1-3% GDP; - agri N share 75%

potential damage costs per watershed



Sobota et al 2015

Workplan 2018-2019 Tasks 1.4.1, 1.4.2, 1.4.3

- INMS Wiki N valuation literature database and classification
- Review and report existing threat benefit valuation studies (Chapters 1-4): identify gaps and priorities (in F Collins)
- Refine/adjust Tier 4 and 5 approach for developing economies
  - Pantanal, Lake Victoria B, India (?)
  - Metrics for Food benefits
  - Proxies for extrapolation of EU, US results
- Fill acknowledged gaps for valuation of Marine and Terrestrial ecosystem impacts
- Harvest existing meta-analyses; define and commission new meta analysis

Activity 1.4: development of approaches for N threat-benefit valuation	17	2018				2019				2020				2021		
	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
Task 1.4.1 Review of existing threat benefit valuation studies			~~R~~ M	W	R											
Task 1.4.2 Refinement of threat benefit valuation across contrasting economies				W		R										
Task 1.4.3 Integration of food, health, ecosystem, climate & energy benefits & threats				W		~~M~~			R							
Task 1.4.4 Valuation of threats & benefits under future nitrogen scenarios													R			
Monitoring and Evaluation					R				R				R			R

Update on A1.5

Component 1
Tools & Methods for the N cycle

$1400K

Van Grinsven/Baron

Activity 1.5
Flux-impact path models for assessment, scenarios & strategy evaluation

$390k

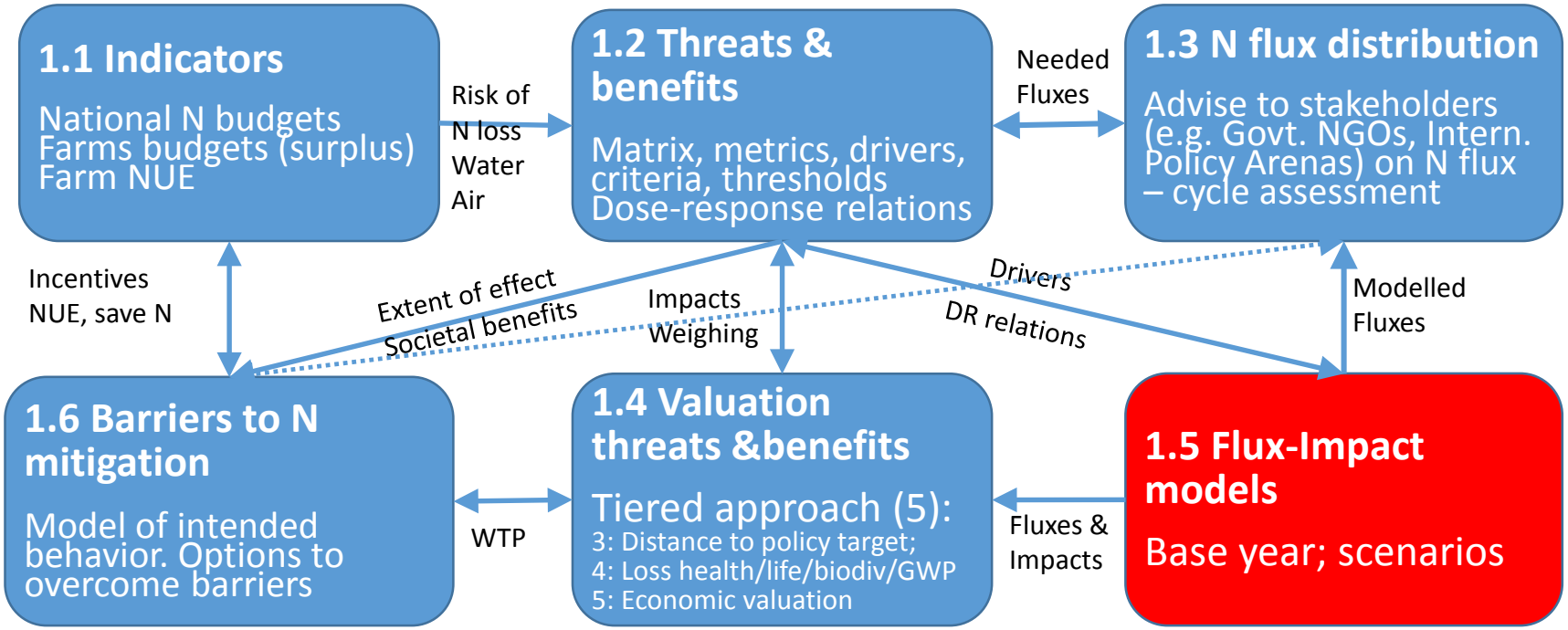
De Vries, Winiwarter

Output 1.5
Approach for existing N flux/pathway models for global/regional assessments and visualisation potential scenarios

Task 1.5.1 Translation of storylines & scenarios into defined **modelling requirements**	$30k	*De Vries/ Winiwarter*	**Task Output 1.5.1** Proposed approach to implement storylines & scenarios presented for stakeholder feedback
Task 1.5.2 **Review** of component **models, criteria, data needs,** information flow & outputs	$60k	*De Vries/ Winiwarter*	**Task Output 1.5.2** Document & database on component models, data, info flow & outputs
Task 1.5.3 **Design of model framework** in relation to storylines, measures and indicators	$70k	*De Vries/ Winiwarter*	**Task Output 1.5.3** Document on criteria & necessary components for integrated N modelling cluster
Task 1.5.4 Application of selected component models in **N model cluster**	$180k	*De Vries/ Winiwarter*	**Task Output 1.5.4** Demonstrated output for model cluster, linking N flows & effects global & regional
Task 1.5.5 **Application N model cluster** for key scenarios at global/regional scales	$50k	*De Vries/ Winiwarter*	**Task Output 1.5.5** Report on N flux/pathway modelling approach for global/regional scenarios

Storylines/scenarios from A2.4

C1 – Linkage and interaction



C1-C2 Interaction meetings on Wednesday

Activity 1.6

Component 1
Tools & Methods for the N cycle

$1400K

Van Grinsven/Baron

Activity 1.6
Examination barriers achieving better nitrogen management

$88k

Masso/Cordovil

$20k network coordination

Output 1.6
Understanding barriers to change (government, private sector and civil society) including technical, financial and socio-political limitations.

Options for change from A.2.3

Task 1.6.1
Examination of economic, cultural & other factors that affect adoption of measures

$10k (+10k)

Cordovil/Masso

Task Output 1.6.1
Report on the economic & cultural factors helping/ hindering adoption of options

Task 1.6.2
Global/regional examination of N barriers to change in food systems

$30k

Gu/Masso

Task Output 1.6.2
Report on global/regional barriers to better N managment in the food system

Task 1.6.3
Global/regional examination of N barriers to change in consumption-production

$30k

Westhoek/Cordovil

Task Output 1.6.3
Report on N barriers for global/ regional consumption-productn

Task 1.6.4
Exploration of options to overcome barriers inc. the role of a full N approach

$18k (+10k)

Masso/Cordovil

Task Output 1.6.4
Report informing global analysis & regional demos on overcoming barriers to change

Activity 1.6 Examination of barriers achieving to better nitrogen management	17	2018					2019				2020				2021		
		Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3	Q 4	Q 1	Q 2	Q 3
Task 1.6.1 Examination of economic, cultural & other factors that affect adoption of measures	M			R													
Task 1.6.2 Global/regional examination of N barriers to change in food systems							M					R					
Task 1.6.3 Global/regional examination of N barriers to change in consumption-production							M					R					
Task 1.6.4 Exploration of options to overcome barriers, including the role of a full N approach												M				R	
Monitoring and Evaluation						R				R				R			R

Progress Q4-17; Q1-18

- Evora workshop October 2017
- Draft workplan
- Started development of a survey form about factors and barriers for adoption of measures and for changes in the agro-food system
  - Includes aspects of A1.6.2. and A1.6.3
  - Feedback from some experts and INMS
- Next step is interaction with Stakeholders and C3

Some general C1 concerns

- Global coverage and engagement
  - How to engage broader INMS community, new blood
  - Expertise from Southern hemisphere
- Commitment
  - new INMS team members; busy experts
  - Year 1 and 1st meeting for team building
- Linkage (time and content) to other activities
- Balance between delivery of methods and results
- Overhead for communication, administration
- Delayed contracts – limited resources