



DAAD

Regional Alumni Meeting

“Environment and Health. Challenges and Prospects for South-East Asia”

26-28 May 2017 in Hanoi, Vietnam

CONTRIBUTION

OF EDUCATION & RESEARCH TO SUSTAINABLE DEVELOPMENT BETWEEN
THE POLES OF GROWTH, ENVIRONMENT & HEALTH:
MARINE INVASION IN INDONESIA



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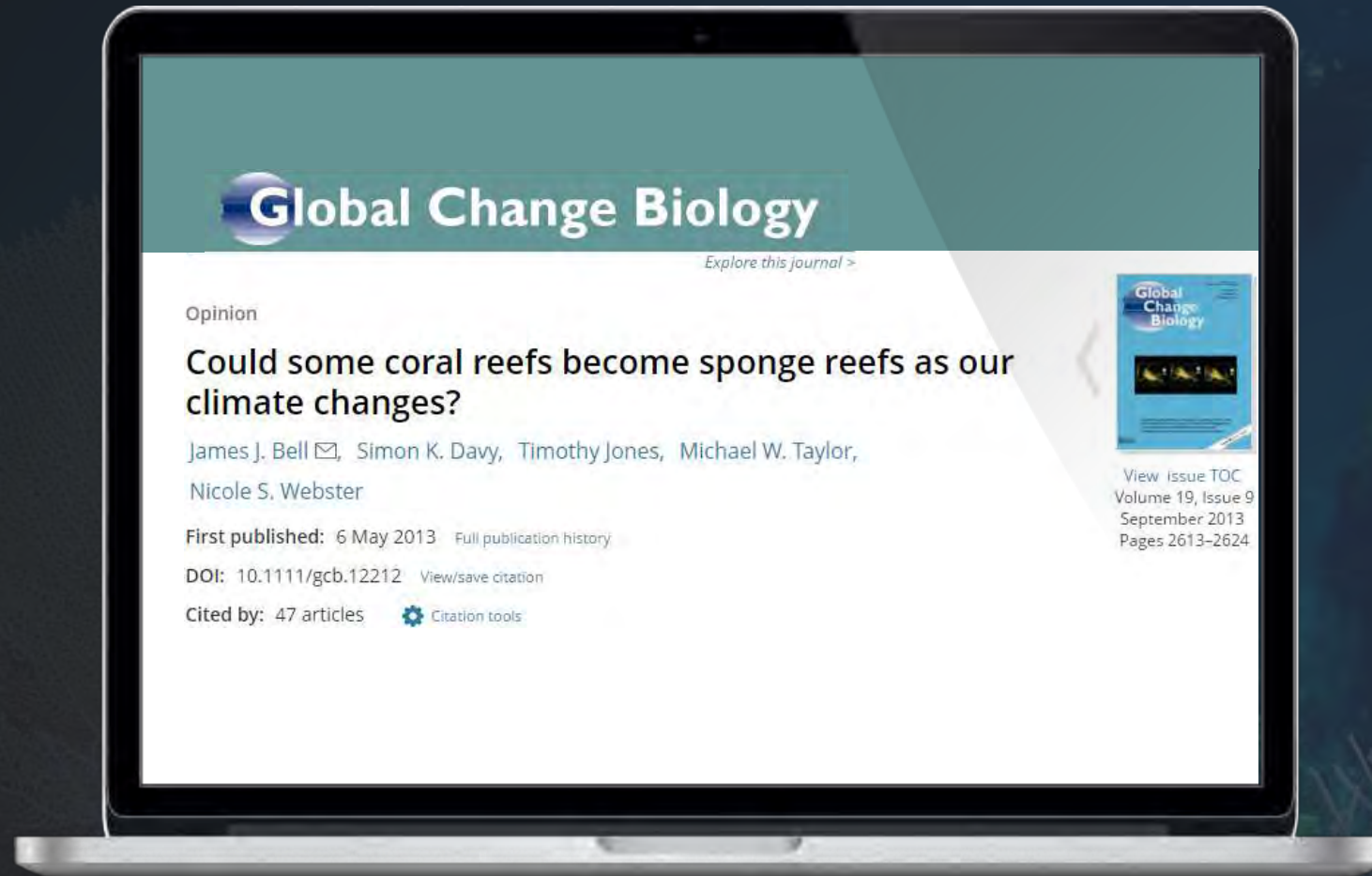
(c) Carsten Thoms
www.spongepage.info

► Many sponges produce chemicals with pharmaceutical activity

(new “drugs from the seas” against cancer,
malaria, inflammation, HIV...)

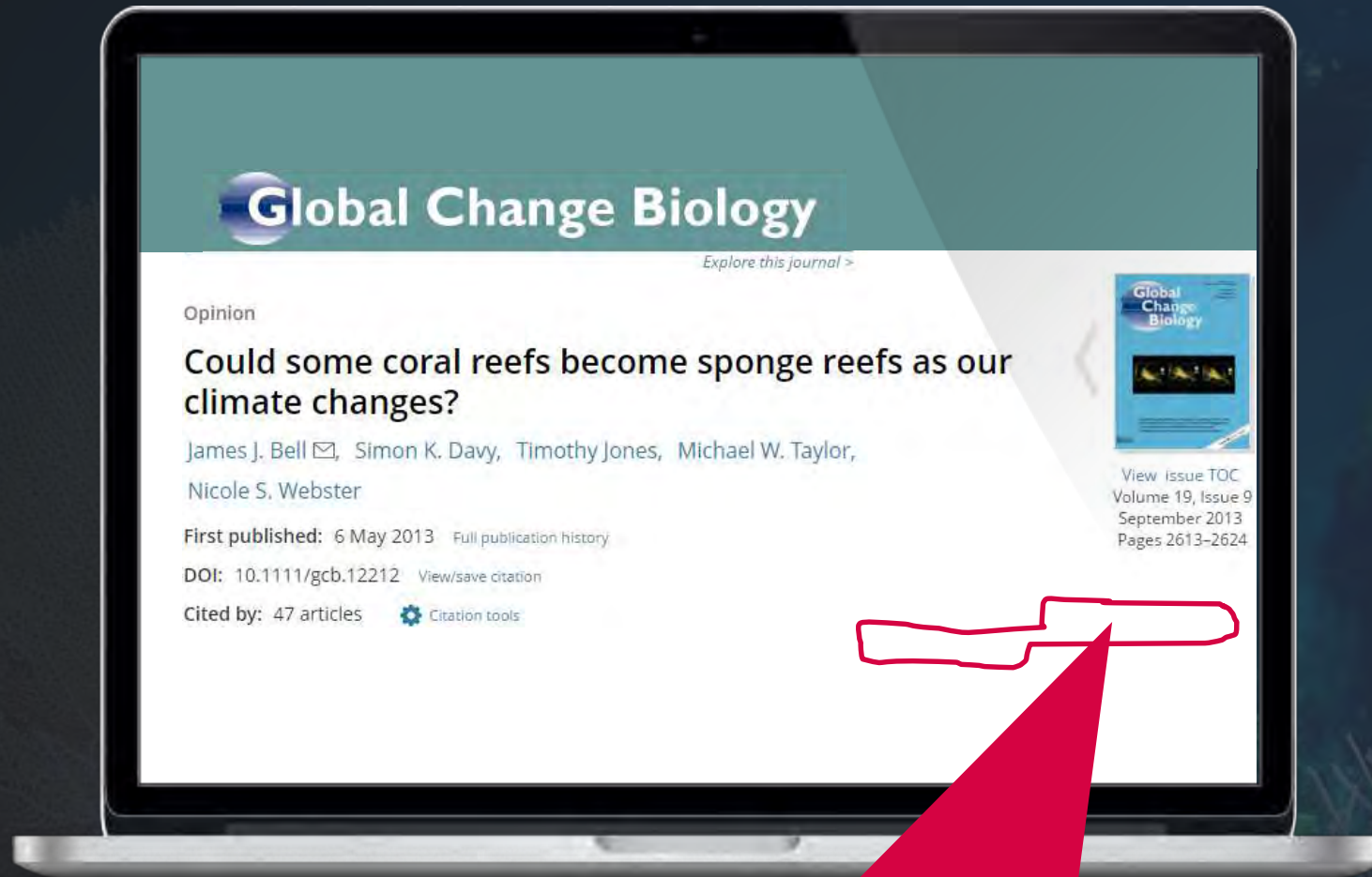
► Sponges provide
important ecosystem functions
in intact coral reefs

> **12,000**
species world-wide

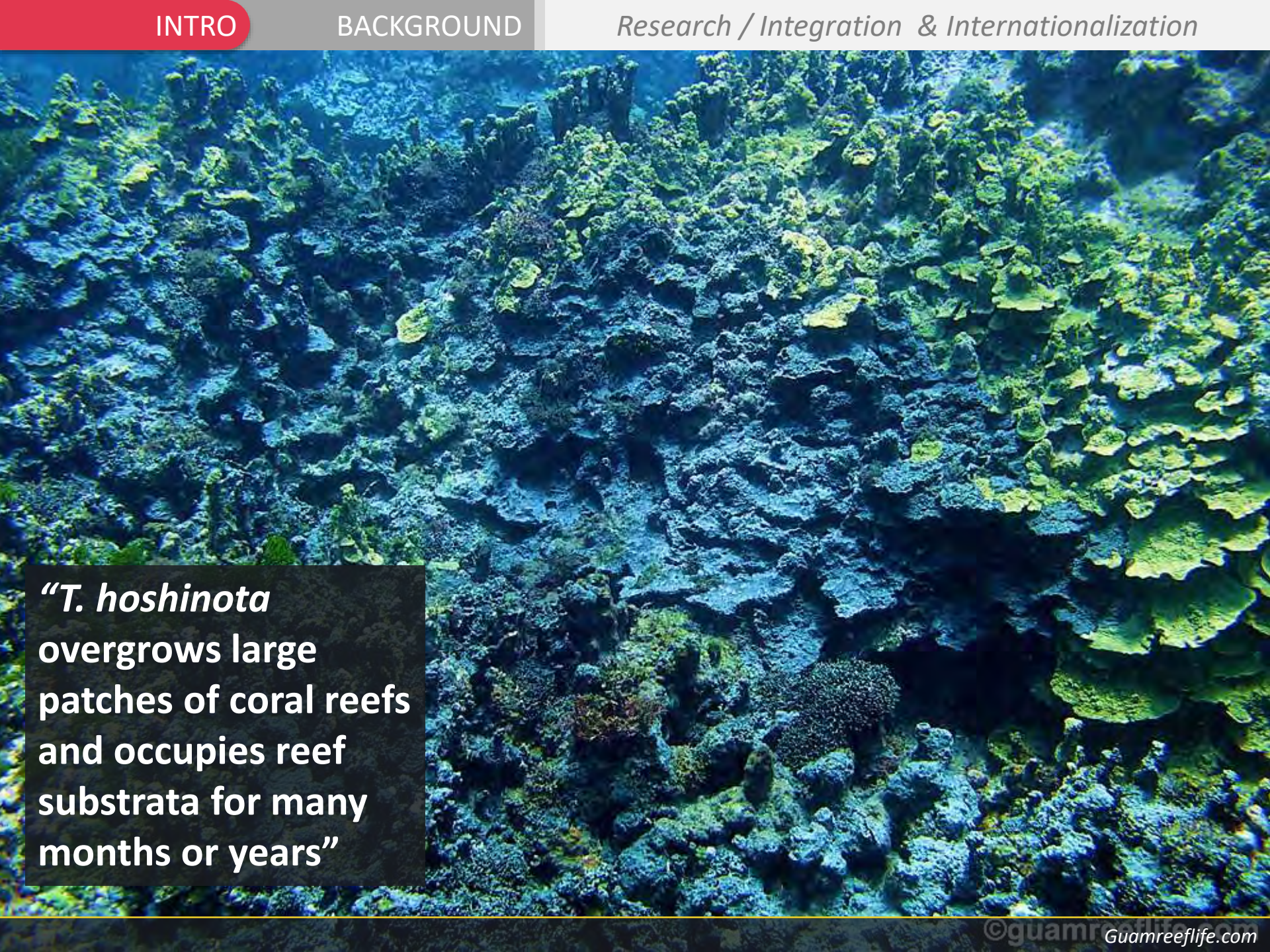


AUTHOR HYPOTHESES

- ▶ sponges profit from the **climate change-induced weakness of corals**
- ▶ this may result in **sponge proliferation** in coral reefs



It was, however, found overgrowing large areas of coral in the Thousand Islands, Java



“T. hoshinota
overgrows large
patches of coral reefs
and occupies reef
substrata for many
months or years”



“
 Presumed invasion
 pathway of *Terpios
 hoshinota* into
 Indonesian coral
 reefs
 ”

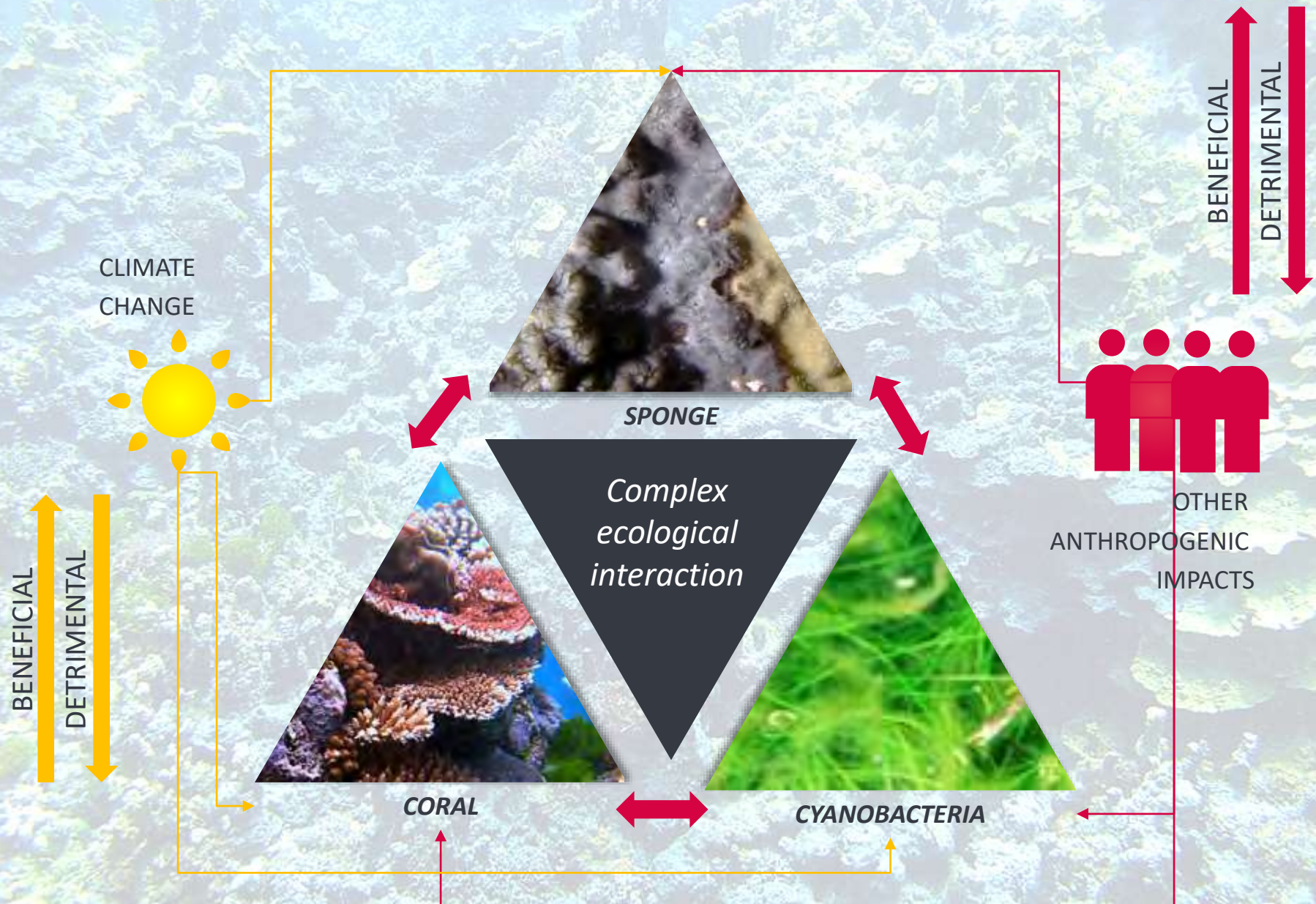


CORAL

FILAMENTOUS CYANOBACTERIA

Observation by Schils 2012:
Sponge becomes more successful and quicker in killing corals when in association with filamentous cyanobacteria

T. HOSHINOTA




Is there a link between the SPONGE INVASION and CLIMATE CHANGE EFFECTS ? life.com

STATUS PRIOR

INTEGRATED MODULES

VISAGED PROJECT OUTCOME



STATUS PRIOR TO PROPOSED RESEARCH



Accumulating reports on invasions of the coral-killing sponge *Terpios hoshinota* into Indonesian coral reefs



Lack of knowledge on...

- ▶ ...extent of threat
- ▶ ...invasion pathways
- ▶ ...invasion-driving factors
- ▶ ...mechanism of coral-killing
- ▶ ...ecological interactions of the sponge
- ▶ ...possible counteractions

A

Monitoring sponge invasions and potential invasion-driving factors

- Coordinated monitoring across the Indonesian archipelago
- Development of novel large-scale ocean acoustic monitoring technologies
- Field studies: Transfection & eutrophication experiments

B

Identification of invasion pathways

- Pattern elucidation of population fragmentation, genetic distribution, and gene flow among populations by molecular phylogeography and metagenomics
- DNA Barcoding for species identification

C

Investigating allelopathic and symbiotic interactions

- Unraveling the sponge <> cyanobacteria <> coral interaction with modern microbiological and chemo-analytical means (NGS, metabolomics)
- Establishing the MinION™ technology to investigate the sponge-associated cyanobacterial community

D

Identification of novel bioactive compounds

- targeted discovery novel anti-cancer and anti-infective drugs based on ecological knowledge gained from module C

STATUS PRIOR

INTEGRATED MODULES

ENVISAGED PROJECT OUTCOME

- ▶ Invasion **counteractions** for reef conservation and ecosystem management
- ▶ International research & education **network**
- ▶ **Capacity-building** in analytical technologies
- ▶ Joint **publications** in high-ranking international journals
- ▶ **Patents** on novel pharmaceuticals and reef monitoring technologies



THANKYOU

