

Data		Results					
	Waterbody	Biota	Sediment	BioEffect	Worst	ConSum	Status
1	'1			0.29	BioEffect	0.29	High
2	'12		0.33		Sediment	0.33	High
3	'21		0.82	0.33	Sediment	0.82	Good
4	'22		0.62		Sediment	0.62	Good
5	'3		0.44	0.95	BioEffect	0.95	Good
6	'36	7.63			Biota	7.63	Poor
7	'39		0.73	0.88	BioEffect	0.88	Good
8	'53	4.75	1.64		Biota	4.75	Moderate
9	'54	5.53			Biota	5.53	Poor
10	'71	13.74			Biota	13.74	Bad
11	'72	14.48	1.26	1.02	Biota	14.48	Bad
12	'73			0.97	BioEffect	0.97	Good
13	'90	8.07	0.58		Biota	8.07	Poor
14	'92		2.70		Sediment	2.70	Moderate

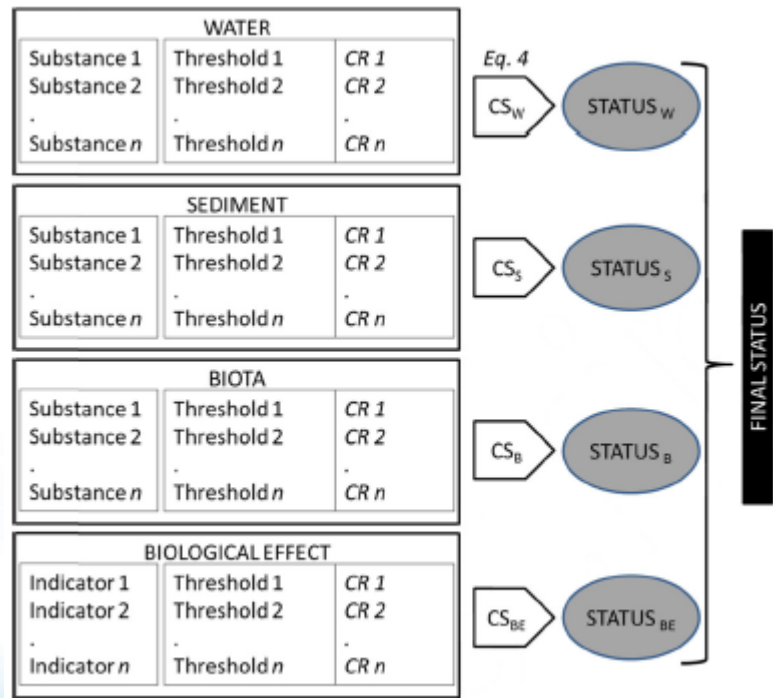
## The CHASE Tool

Ciarán Murray, NIVA Denmark

Second HELCOM BalticBOOST Workshop on the HOLAS II hazardous substance assessment

Copenhagen, 13-14 Sep. 2016

# CHASE Principles



Andersen, J. H., Murray, C., Larsen, M. M., Green, N., T. Høgåsen, K. Gustavson, ... (submitted). (2015). Development and testing of a prototype tool for integrated assessment of chemical status in aquatic environments.

<http://doi.org/10.1007/s10661-016-5121-x>

Environ Monit Assess (2016) 188: 115  
DOI 10.1007/s10661-016-5121-x



## Development and testing of a prototype tool for integrated assessment of chemical status in marine environments

Jesper H. Andersen · Ciarán Murray · Martin M. Larsen · Norman Green · Tore Høgåsen · Elin Dahlgren · Galina Garnaga-Budrè · Kim Gustavson · Michael Haarich · Emilie M.F. Kallenbach · Jaakko Mannio · Jakob Strand · Samuli Korpinen

Received: 3 July 2015 / Accepted: 14 January 2016 / Published online: 25 January 2016  
© Springer International Publishing Switzerland 2016

**Abstract** We report the development and application of a prototype tool for integrated assessment of chemical

These ratios are combined within matrices, i.e. for water, sediment and biota and for biological effects. The over-

# CHASE Calculation Method

$$CR = \frac{C_m}{C_{\text{Threshold}}} \quad (1)$$

$$CS = \frac{1}{\sqrt{n}} \sum_{i=1}^n CR_i \quad (2)$$

CS	Status
< 0.5	GES
0.5 - 1	
1 - 5	sub-GES
5 - 10	
> 10	

$$CR_{\text{mean}} = \frac{1}{n} \sum_n CR_m \quad (3)$$

$$CR_{\text{RMS}} = \sqrt{\frac{1}{n} \sum_{i=1}^n CR_i^2} \quad (4)$$

$$CF_m = \frac{C_m}{C_{\text{baseline},m}} \quad (5)$$

$$PLI = \sqrt[n]{CF_1 \times CF_2 \times \dots \times CF_n} \quad (6)$$

# R Code

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NIVA-Denmark / CHASE

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CHASE Tool for Hazardous Substance status assessment — Edit

3 commits 1 branch 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

Commit	Message	Time
gitignore	CHASE assessment first version	13 days ago
CHASER	Contamination sum failed with missing values. Now fixed	13 days ago
CHASE.Rproj	CHASE assessment first version	13 days ago
CHASE_test.R	CHASE assessment first version	13 days ago
README.md	Create README.md	13 days ago
example_assessment.csv	CHASE assessment first version	13 days ago

## CHASE

CHASE Tool for Hazardous Substance status assessment

The original CHASE tool was developed in Excel. This tool performs the same calculations using R.

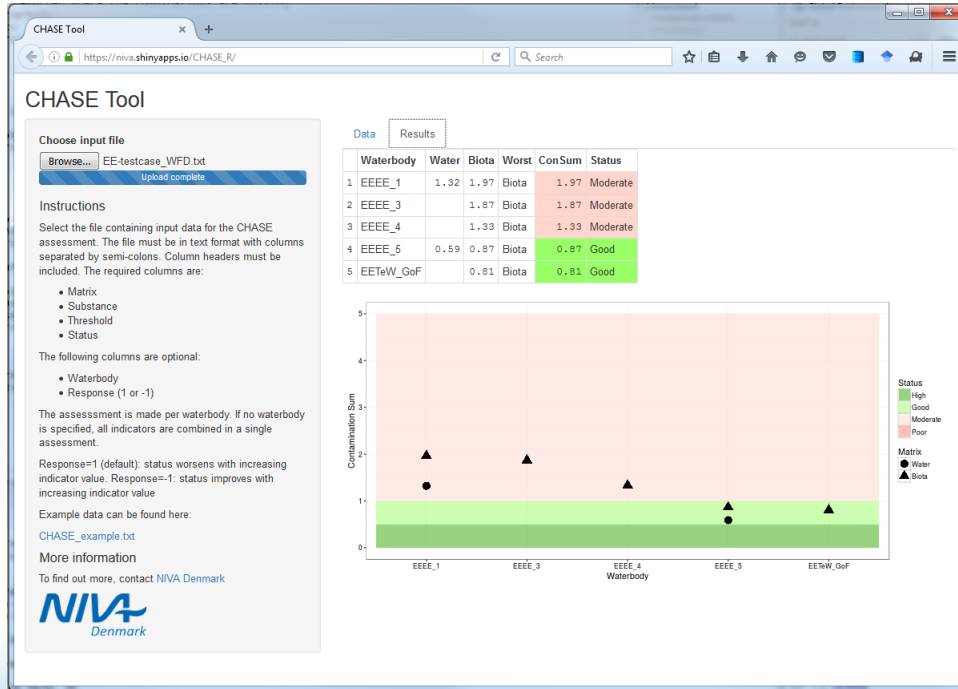
Development of the Excel tool is described here: "We report the development and application of a prototype tool for integrated assessment of chemical status in aquatic environments based on substance- and matrix-specific environmental

<https://github.com/NIVA-Denmark/CHASE>

```
165 lines (130 sloc) | 4.63 KB
Raw Blame History

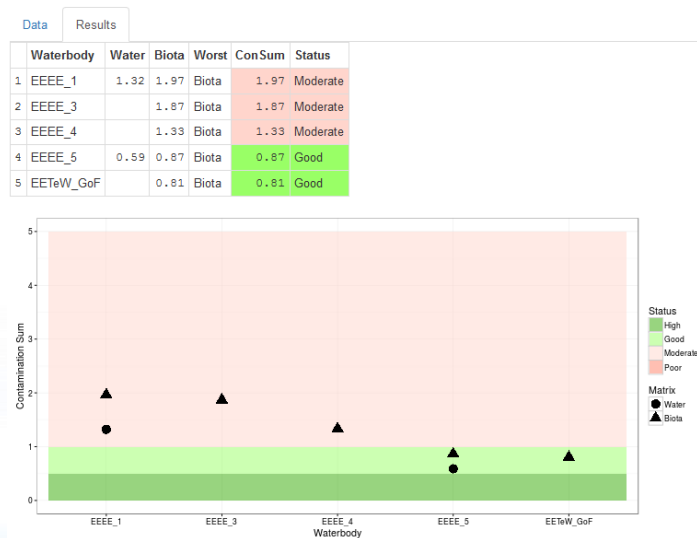
1 library("dplyr")
2 library("tidyr")
3
4 #=====
5 # function Assessment
6 Assessment<- function(assessmentdata,summarylevel=1){
7
8
9
10 requiredcols <- c("Matrix","Substance","Threshold","Status")
11 extracols <- c("Waterbody","Response")
12
13 #Check column names in the imported data
14 cnames<-names(assessmentdata)
15 nimp = ncol(assessmentdata)
16 nreq = length(requiredcols)
17 nextra = length(extracols)
18
19 ok <- rep(0, nreq)
20 okextra <- rep(0, nextra)
21 foundresponse=FALSE
22
23 for (i in 1:nimp){
24   for (j in 1:nreq){
25     if(toupper(requiredcols[j])==toupper(cnames[i])){
26       names(assessmentdata)[i] <- requiredcols[j]
27       ok[j]=1
28     }
29   }
30   for (j in 1:nextra){
31     if(toupper(extracols[j])==toupper(cnames[i])){
32       names(assessmentdata)[i] <- extracols[j]
33       okextra[j]=1
34     }
35   }
36 }
37
38 for(j in 1:nextra){
39   if(okextra[j]==0){
40     assessmentdata[[extracols[j]]]<-1
41   }
42 }
43
44 nc<-sum(ok, na.rm = TRUE)
45
46 if(nc<nreq){
47   # The required columns were not found in the input data
48   message("Error in CHASE Assessment. Required column(s) were not found in the input data:")
49   for (j in 1:nreq){
50     if(ok[j]==0){
```

# Shiny app



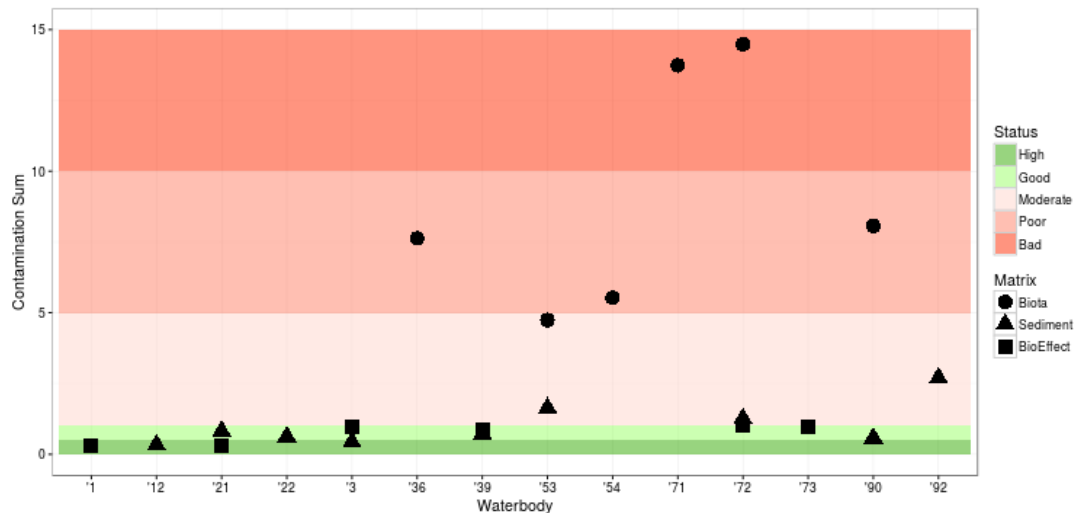
[https://niva.shinyapps.io/CHASE\\_R/](https://niva.shinyapps.io/CHASE_R/)

# Shiny app



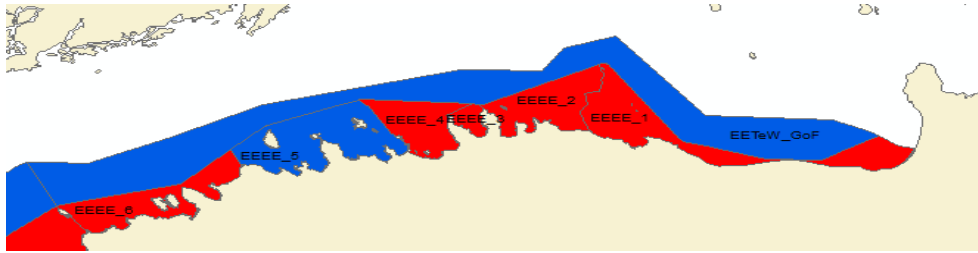
# Shiny app

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# Case Studies

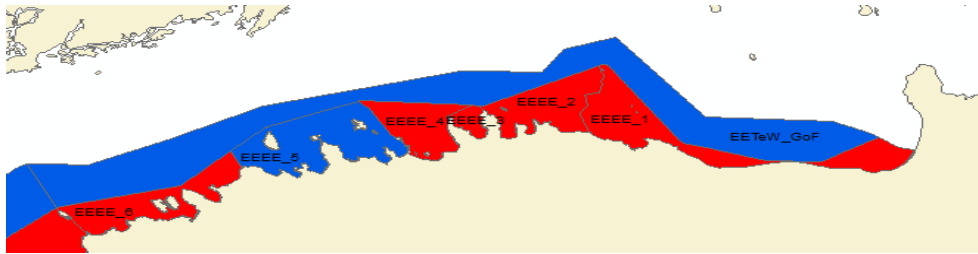
## Estonia



Open Sea sub-basins



# Case Study – Estonia



## 5 Assessment Areas

- 4 coastal
- 1 offshore

## Comparison:

- WFD (OOAO)
- CHASE (WFD indicator set)
- CHASE (Core indicator set)
- CHASE (“Core +3”)  
HCB, DDT, Cu

# Case Study – Open Sea



3 open sea sub-basins:

- Kiel Bay
- Arkona Basin
- East Gotland basin

Data sources

- ICES Combine
- HELCOM (radionuclides)

2 methods compared:

- OOA per substance
- CHASE aggregation