INTEGRATION OF ECONOMIC-ENVIRONMENTAL-HEALTH ACCOUNTS

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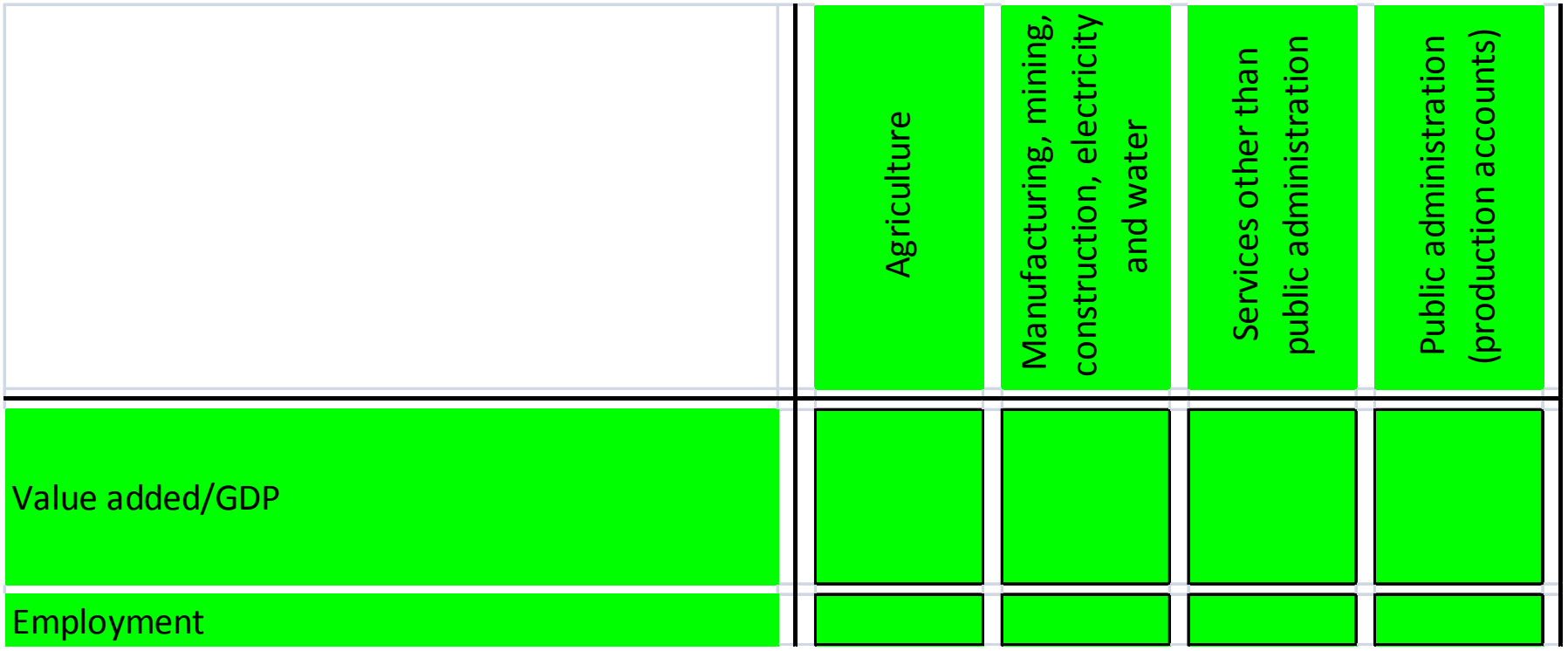
Alternative health satellite accounts may be developed

- Present OECD-PAHO Health accounts may be considered as a special case of satellite accounting, with emphasis on
  - measuring the relative size of health expenses in terms of GDP,
  - who receive and who pays for health care services
- Another format of Economic-Environmental-Health Accounts (HENVIR) was developed for a region of Guatemala: Atitlan. In this framework, emphasis is on
  - economic-environmental causes (impacts caused) affecting water quality (impacts borne) in Lago Atitlán
  - Deteriorating quality of water generating water related diseases in the region

Design of alternative frameworks of and supporting Health Accounts

Framework I: Analysis of GDP
Principal basis for Health and other Satellite Accounts



Framework II: Regional Accounting Basis for Economic-Environmental Accounting

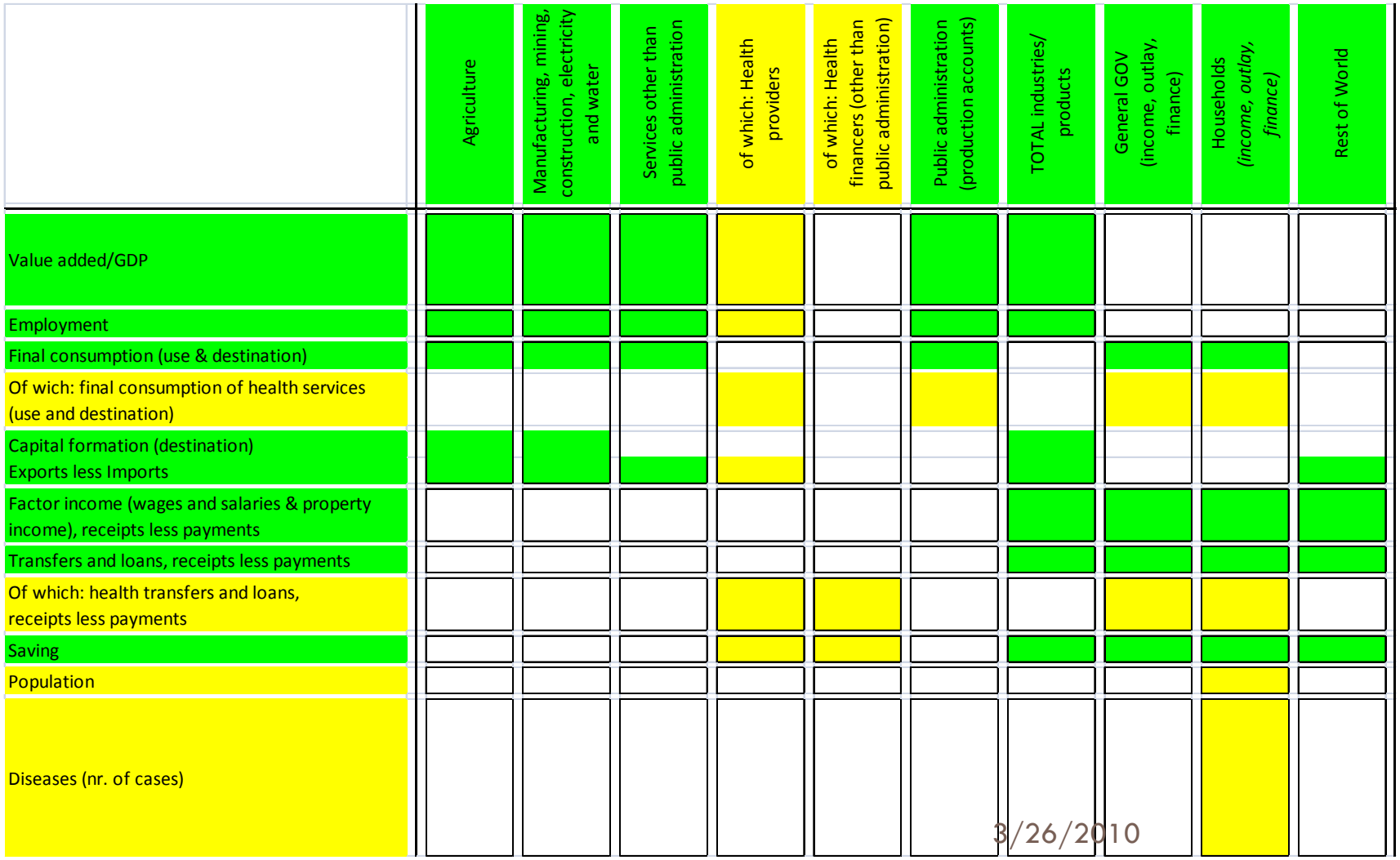
	Region 1	Region 1	Region 1	Region 1	Region 1	.....	Region N	Region N	Region N	Region N	Region N	Country Total	Country Total	Country Total	
	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	.....	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)
Value added/GDP						.....									
Employment						.....									

Framework III: Accounts for GDP and Well-Being

Basis for OECD-PAHO Health Accounts

	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	General GOV (income, outlay, finance)	Households *(income, outlay, finance)*	Rest of World
Value added/GDP	■	■	■	■	■			
Employment	■	■	■	■	■			
Final consumption (use & destination)	■	■	■	■		■	■	
Capital formation (destination) Exports less Imports	■	■	 ■		■			 ■
Factor income (wages and salaries & property income), receipts less payments					■	■	■	■
Transfers and loans, receipts less payments					■	■	■	■
Saving					■	■	■	■

Framework IV: Present OECD-PAHO Health Accounts, Summary presentation



Framework V: Economic-Environmental Accounts

		Region 1	Region 1	Region 1	Region 1	Region 1	.....	Region N	Region N	Region N	Region N	Region N	Country Total	Country Total	Country Total		Country Total	Country Total	Country Total	Country Total
		Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	.....	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	General GOV (income, outlay, finance)	Households *(income, outlay, finance)*	Rest of World
Value added/GDP							.....													
Employment							.....													
Final consumption (use & destination)																				
Environmental Impacts caused (impacts affecting quality of water)	Water use and supply: cantidad (en m3) de uso (-)*, suministro (+) * Land erosion: Cantidad en toneladas métricas Hydrocarbons: Cantidad en m3 Nitrates: Cantidad en m3 P (fosfor): Cantidad en m3 Heavy metals: Cantidad en m3 Sewage: Cantidad en m3 Solid wastes: Cantidad en m3	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production & HH final consumption	.....	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production & HH final consumption	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production		Environmental impacts caused by production		Environmental impacts caused by HH fina+ consumption	
Environmental Impacts borne (Measurement of water quality)	DBO (Demanda Biológica de Oxígeno) (medida por unidad de agua) DQO5 (Demanda Química de Oxígeno) (medida por unidad de agua) Coliformes Fecales (medida por unidad de agua) Turbiedad (medida por unidad de agua) pH Oxígeno disuelto (mg/L) E.coli (NMP/100ml) Nitratos (mg/L NO3-) Nitritos (mg/L NO2-) Fosfatos (mg/L PO43-) "Concentración de metales pesados: plomo, mercurio, etc. (medida por unidad de agua)"					Measurement of water quality	.....					Measurement of water quality					Measurement of water quality			

Framework VI: Economic-Environmental-Health Accounts for Lago Atitlán

		Region 1	Region 1	Region 1	Region 1	Region 1	.....	Region N	Region N	Region N	Region N	Region N	Country Total	Country Total	Country Total		Country Total	Country Total	Country Total	Country Total
		Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	.....	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	Agriculture	Manufacturing, mining, construction, electricity and water	Services other than public administration	Public administration (production accounts)	TOTAL industries/ products	General GOV (income, outlay, finance)	Households *(income, outlay, finance)*	Rest of World
Value added/GDP							.....													
Employment							.....													
Employment: Access to water							.....													
Final consumption (use & destination)							.....													
Environmental Impacts caused (impacts affecting quality of water)	Water use and supply: cantidad (en m3) de uso (-)*, suministro (+) * Land erosion: Cantidad en toneladas métricas Hydrocarbons: Cantidad en m3 Nitrates: Cantidad en m3 P (fosfor): Cantidad en m3 Heavy metals: Cantidad en m3 Sewage: Cantidad en m3 Solid wastes: Cantidad en m3	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production & HH final consumption	.....	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production & HH final consumption	Environmental impacts caused by production	Environmental impacts caused by production	Environmental impacts caused by production		Environmental impacts caused by production		Environmental impacts caused by HH final consumption	
Environmental Impacts borne (Measurement of water quality)	DBO (Demanda Biológica de Oxígeno) (medida por unidad de agua) DQO5 (Demanda Química de Oxígeno) (medida por unidad de agua) Coliformes Fecales (medida por unidad de agua) Turbiedad (medida por unidad de agua) pH Oxígeno disuelto (mg/L) E.coli (NMP/100ml) Nitratos (mg/L NO3-) Nitritos (mg/L NO2-) Fosfatos (mg/L PO43-) "Concentración de metales pesados: plomo, mercurio, etc. (medida por unidad de agua)"	Measurement of water quality				Measurement of water quality	.....					Measurement of water quality					Measurement of water quality			
Population							.....													
Population: Access to water							.....													
Diseases (nr. of cases)	Infant mortality Diarrea Disentería Enfermedades de la piel Cólera Otras enfermedades de origen hídrico						.....													

Compilation of Economic-Environmental-Health Accounts

The approach followed in the Guatemala project was

- First to design the framework, based on clearly defined objectives, i.e. establishing the link between economic activities, causing deterioration of water quality in the lake, and this in turn causing water related diseases in a part of the population without access to public water facilities, which is directly using the water of the lake for drinking, bathing and sewage purposes.
- Secondly defining the compilation approach early on, even with deficient data, in order to test the framework and its feasibility to generate estimates of all variables (i.e. cells) in the framework)
- Compiling accounts in frameworks has the advantage that indirect estimates of variables can be made, even if no basic data are available on many variables

Indirect estimates of variables can be made, using:

- Basic data, supplemented by a large number of
- Values of ratios between variables, e.g.
  - i-o ratios between output and value added,
  - productivity ratios between employment and output,
  - wages rates between employment and compensation of employees,
  - tax rates between income and income taxes or premiums of social security schemes
  - etc, etc.
- Identities that hold between the variables with and without basic data, e.g.
  - Supply-use identities between output and intermediate and final uses of products
  - Value added defined as the difference between output and intermediate consumption
  - Saving defined as the difference between disposable income and final consumption
  - Identities between receipts and payments of taxes, or between receipts and payments of transfers,
  - etc., etc.

Multiple regression analysis

Multiple regression analysis was used to estimate, on the basis of observations in different regions, coefficients (ratios) of

- Economic Activities-Environmental Impacts Caused relations
- Environmental Impacts Caused-Borne relations
- Disease- Environmental Impacts Borne relations

(See C1, C2 & C3 coefficient matrices)

BHENVIR.xlsm

A Bayesian method was used to generate estimates of all variables (cells) in the Guatemala HENVIR framework

Estimates were made in three stages:

- Stage 1: Tentative estimates, based on a selection of ratios and identities
- Stage 2: Revision of Tentative estimates by specialists (e.g. national accountants)
- Stage 3: Bayesian estimation, using all ratios and identities, in which conflicts between basic data, ratio values and identities are resolved, using relative (ex ante) reliabilities of basic data and ratio values, as criteria for making adjustments to (ex ante) data to arrive at ex post estimates

THANK YOU

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