

基于物质流动分析的可持续性社会的设计

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- 在此，我想就衡量地区如何有益于环境的方法、测量尺度进行报告。首先，我想把良好的资源和能源供给的维持与对环境和生态系统不产生负的遗产这两点作为 SUSTAINABILITY 这一概念的条件提出。
- 那么，我们如何设计地区的 SUSTAINABILITY 呢？为此，把握现状和设定目标必不可少。其次，必须要有实现目标的方法、技术以及对相关对策和是否可以得到市民合作的评价方法。
- 在此引进 MFA (Material Flow Analysis or Material Flow Accounting) 这一概念。MFA 日语译为“物质流动分析”。MFA 的目的是以地区为单位从数量上把握其一年内进入该地区的物质的量、从该地区排出的物质的量，以及储存在该地区内的物质的量。
- 作为一个例子，我介绍一下维也纳工科大学的学者们研究镉的事例。根据该研究的收支计算，我们知道有多少量的镉在该地区消失、明确了问题的所在。
- 根据屋久岛的物质流动分析，一年间大约 11000 吨米和豆子等农作物流入该岛，桔子类等从该岛流出。我们由此知道了假设在该岛农作物的购买变成不可能的事情的话，即使最大限度地利用休耕地种米的话，也不可能把从岛外输入米的量降为零。种米的时候需要从岛外输入肥料、堆肥等。
- 因为米价便宜，农家仅靠种米难以维持生计，所以人们在土木产业、观光产业工作，种植有高附加值的柑橘类。看了这样的数据，屋久岛今后向哪个方向发展应该由岛民自己决定。
- 对于废弃物进行 MFA 时，一年买入东西的二分之一到三分之一变成垃圾排出。我们由 MFA 得知从物资的购入到垃圾的排出，不管如何进行循环和燃烧，如果不从根本上断绝原因那么事态就不能被改善。这样，MFA 成为设计可持续发展社会的有力工具。
- 对于水进行 MFA 也是必要的。我把日本的东三河地方和中国北京附近的地区作为调查地，以水不足地区作为研究对象，从本年度开始展开了 MFA 的共同研究。其目的在于研究如何建设适合各个地区的水的体系。处理水的再利用、处理水的高度化等问题也包含在其中。今后如果有机会的话，我想就该研究的结果进行报告。

(榎根勇 执笔，高娜 译)

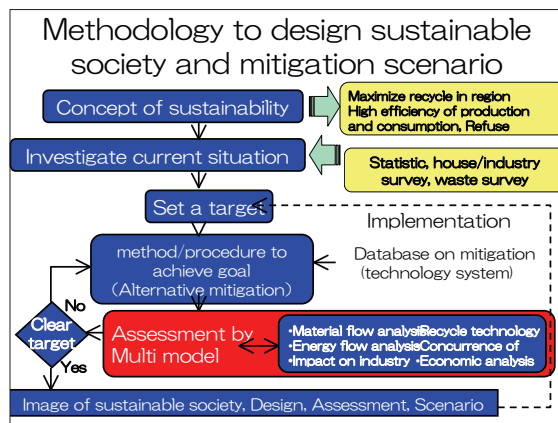
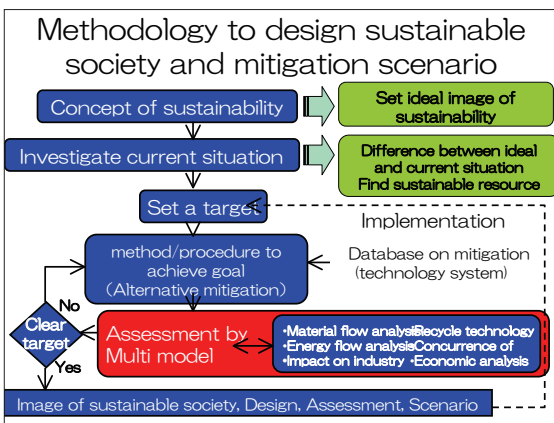
Design of sustainable society based on material flow analysis
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What is sustainable society?

- In order to achieve sustainable society, what should be sustainable?
- Economics, Environment
 - Energy, Resource, CO₂, Waste, Chemicals and so on

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- Supply of resource and energy
- Not accumulate of negative impact

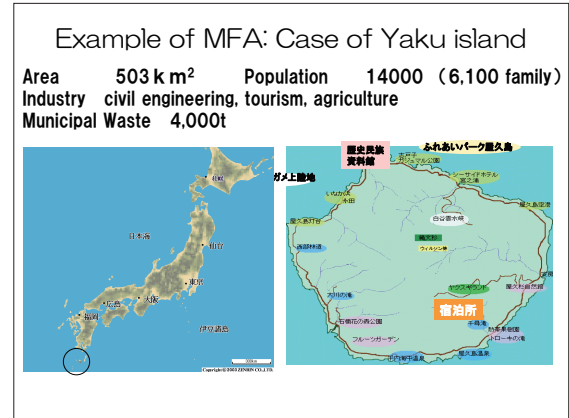
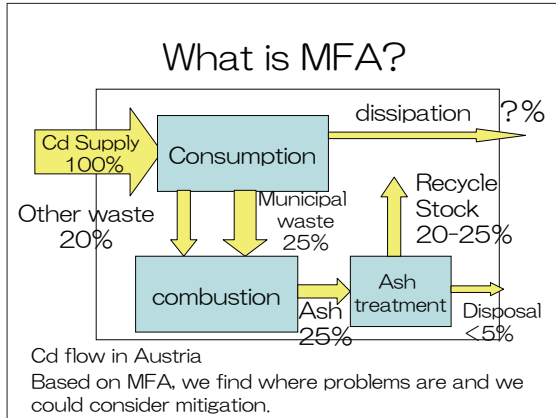


How to establish sustainable society

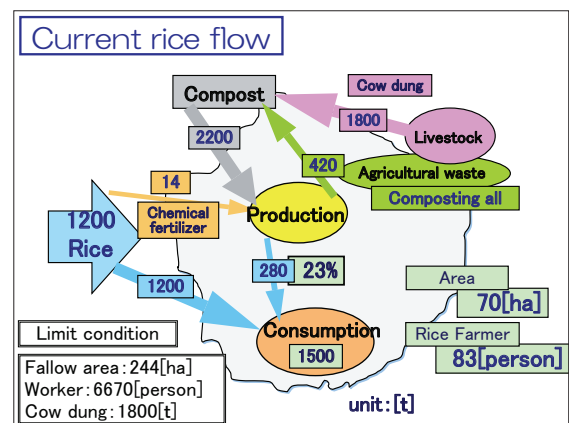
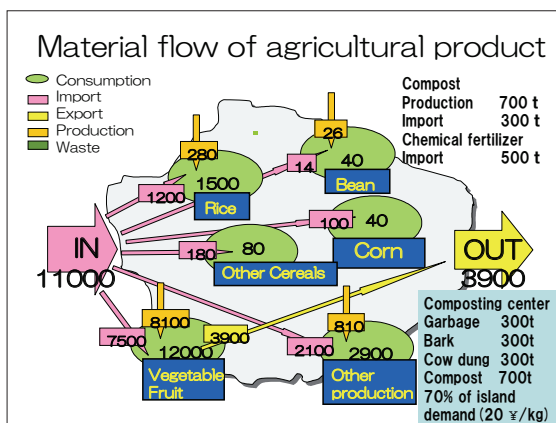
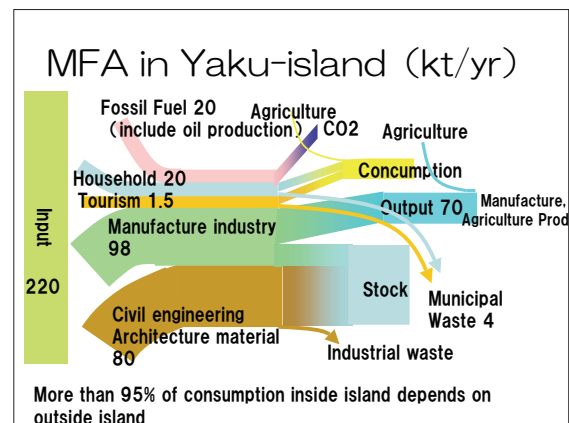
- Set a target
 - CO₂ emission Zero
 - Waste disposal half
- Survey current situation
- Find mitigations
- Assessment from view point of material, energy, economics and citizen

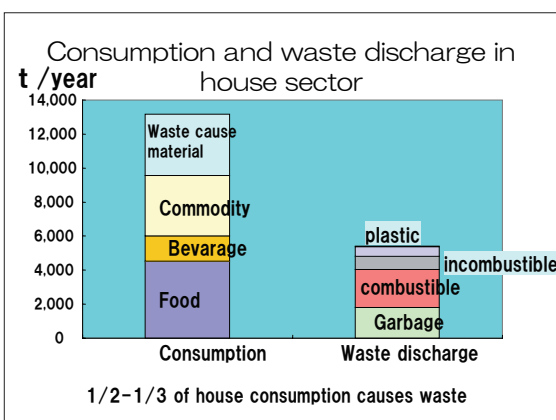
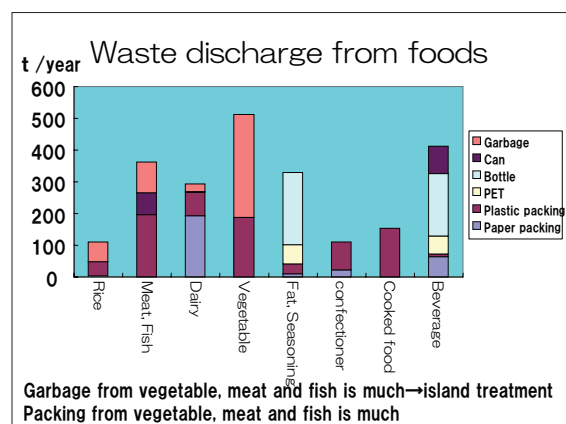
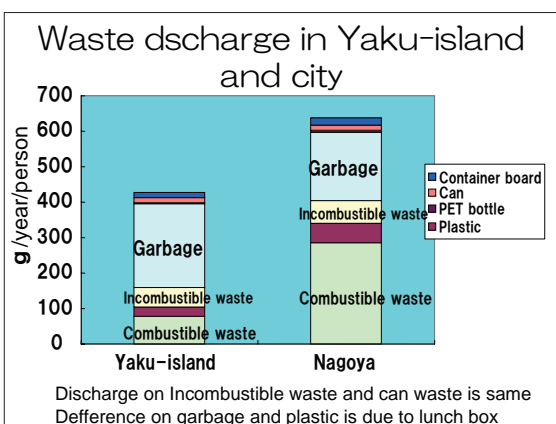
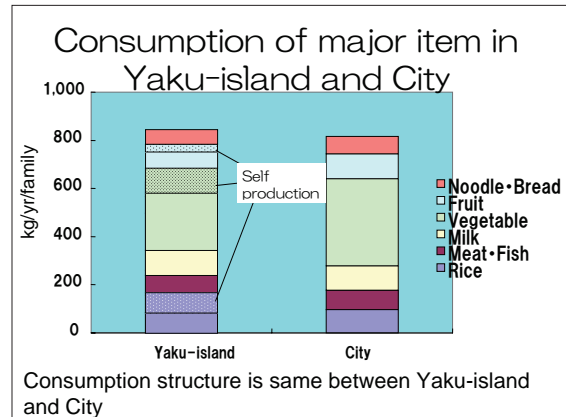
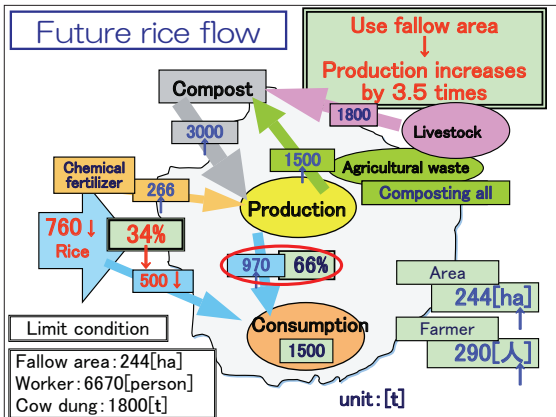
Why MFA?

- Understand current situation on
 - Region
 - Sector
 - Element
 - Production
- Find regional problem
- Assess effect of mitigation



- ### Sustainability based on material flow – set targets
1. Maximize production to outside island and circulation inside island
 - Maximize selling material and reuse/recycle
→Agricultural production, live stock, manure
 2. High efficiency of production and consumption/ long term usage
 - Reduction of environmental load
→Consumer goods, durable goods
 3. Limitation of accumulation and input of material which is difficult to be treated
 - Promotion of "reduce"
→PET bottle, Packing material





Conclusion

- MFA is a useful tool for material management- production-consumption-discharge
- MFA could assess effect of mitigation
- MFA's target is Material, Energy, Product and Water

Water recycle system and mitigation technology in water depletion region

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- Water depletion region: Beijing, China and East Mikawa, Japan
- Advance and High efficiency of waste water treatment
- Usage balance among agriculture, industry and house usage
- Multi-objective recycle of water resource and reduction of environmental impact promoted by waste water treatment and risk assessment system



Research method

1. Survey and design of system
2. Development of advanced waste water treatment
3. Water quality/ risk assessment methodology for water opened loop recycle
4. Environmental impact ripple effect by water treatment and recycle

Based on regional water supply-demand, water treatment and recycle system will be developed with reduction of environmental impact