

# Review of biodiversity mitigation measures of Japan's cooperation projects

30 April, 2019

Tetsuya Kamijo

JICA Research Institute, Tokyo, Japan

39<sup>th</sup> Annual Conference of the IAIA, Brisbane, Australia



# Introduction

1. Biodiversity loss continues though EIA has been implemented for a long time;
2. A narrow focus on biodiversity and limited assessment of ecosystem services are reported; and
3. The CBD invited parties and donors to carry out evaluation studies on the effectiveness of biodiversity impact assessment at IAlA17.

# Purposes

The purposes of the study are:

1. To examine the current situations of biodiversity mitigation measures in EIA reports; and
2. To propose practical approaches for mitigating the adverse impact on biodiversity of development cooperation projects.

# Data and methods 1

1. Samples of 160 EIA reports prepared by JICA (10 per year from 2001 to 2016) were randomly selected. The selection did not consider the ratios of environmental, biodiversity, social, and economic issues in individual projects;
2. Quantitative text analysis (QTA) to alternatives analysis and mitigation measures;

# Data and methods 2

3. Four coding rules (rules to classify data into the specified categories) : environmental issues, biodiversity issues, social issues, and economic issues; and
4. QTA to mitigation hierarchy (avoidance, minimization, and compensation) by periods, types of treatment, and the number of stages of public involvement .

# Quantitative text analysis (QTA)

1. QTA is a method of content analysis for analyzing text data using quantitative analysis method;
2. One benefit is to search the data using coding rules and count the frequency (words of four issues); and
3. Another benefit is to compare text data with others using the appearance ration and chi-square.

# Sectors, regions, and periods of 160 EIA reports

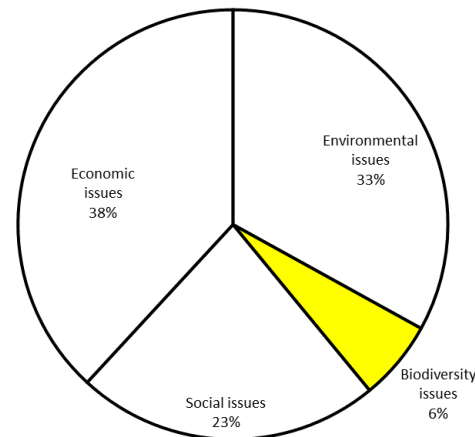
Period	Transportation		Power		Water resource		Reginal development		Pollution control		Agriculture		Total
2001-2004	18	45%	4	10%	6	15%	5	13%	5	13%	2	5%	40
2005-2010	21	35%	11	18%	8	13%	13	22%	4	7%	3	5%	60
2011-2016	21	35%	12	20%	13	22%	7	12%	2	3%	5	8%	60
Total	60	38%	27	17%	27	17%	25	16%	11	7%	10	6%	160

Period	Asia		Africa		Middle East		South America		Europe		Pacific		Total
2001-2004	23	58%	3	8%	4	10%	8	20%	2	5%	0	0%	40
2005-2010	34	57%	10	17%	9	15%	4	7%	2	3%	1	2%	60
2011-2016	38	63%	14	23%	3	5%	0	0%	2	3%	3	5%	60
Total	95	59%	27	17%	16	10%	12	8%	6	4%	4	3%	160

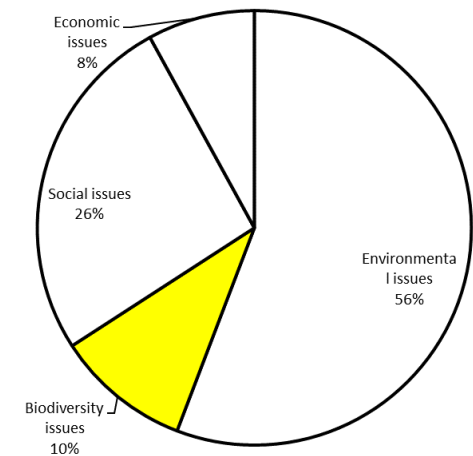
# Coding rules

Issues	Evaluation criteria	Mitigation measures
Environmental issues	environment (30), water (21), pollution (14), noise (10), vibration (9), air (8), waste (7), GHG (green house gas) (6), geology (5), landscape (4), soil (4), erosion (3), groundwater (3), hydrology (3), physical (3), emission (2), gas (2), odor (2), sediment (2), subsidence (2), dust (1), silt (1), sludge (1), waste water (1)	pollution (122), water (119), noise (91), air (81), waste (73), vibration (69), soil (46), landscape (33), odor (29), hydrology (22), erosion (18), sediment (17), groundwater (14), GHG (11), topography (11), contamination (7), geology (6), subsidence (6), dust (5), flood (4), climate (3), drainage (3), flow (3), sludge (3), river (2), silt (2), debris (1), geography (1), groundwater (1), siltation (1), waste water (1)
Biodiversity issues	natural (9), biodiversity (5), protected (4), biology (3), coral (2), ecology (2), ecosystem (2), fauna (2), flora (2), marine (2), vegetation (2), lake (1), mangrove (1), reef (1), wetland (1)	fauna (26), flora (25), ecosystem (22), biodiversity (9), vegetation (7), ecology (5), wildlife (5), forest (4), deforestation (3), protected (3), tree (3), endangered (2), fish (2), mangrove (2), park (2), species (2), animal (1), bird (1), coral (1), habitat (1), reef (1), reforestation (1), trees (1), vegetation (1), wetland (1), wildlife (1)
Social issues	social (28), resettlement (15), land (14), acquisition (9), heritage (5), safety (5), accident (4), society (4), facility (3), culture (2), disease (2), minority (2), population (2), poverty (2), health (2), vulnerable (2), acceptance (1), community (1), conflict (1), coordination (1), disturbance (1), HIV/AIDs (1), life (1), livelihood (1)	resettlement (77), accident (50), social (29), conflict (23), heritage (23), health (17), safety (16), work (15), land (12), misdistribution (12), disease (11), livelihood (11), employment (10), sanitation (10), acquisition (9), community (6), vulnerable (8), HIV/AIDs (7), gender (5), health (5), inequality (5), utility (4), poor (3), poverty (3), children (2), culture (2), facility (2), hazard (2), minority (2), institution (2), child (1), consensus (1), income (1), shadow (1), sunshine (1), woman (1)
Economic issues	cost (40), economy (28), development (10), economic (10), landuse (10), traffic (10), benefit (7), construction (7), access (6), technical (5), technology (5), investment (4), power (4), bridge (3), facility (3), IRR (internal rate of return) (3), operation (3), risk (3), service (3), tourism (3), urban (3), agriculture (2), coal (2), congestion (2), demand (2), employment (2), location (2), maintenance (2), network (2), port (2), recession (2), relevance (2), site (2), source (2), space (2), speed (2), supply (2), transport (2), transportation (2), alignment (1), canal (1), chemical (1), dam (1), demolition (1), distance (1), effect (1), financial (1)	economy (27), traffic (20), landuse (18), use (17), fishery (9), access (4), transportation (4), transport (2), cost (1), agriculture (1), fishing (1), tourism (1)
No mention	no alternatives (67)	no mitigation measures (23)

Evaluation criteria (n=333)



Mitigation measures (n=914)



The number of words of biodiversity issues were small compared to other environmental issues (pollution, noise, water, air, waste, vibration, soil, etc.).



# QTA results of evaluation criteria for alternatives analysis

Period and sector	Environmental issues		Biodiversity issues		Social issues		Economic issues		No alternative		Total
2001-2004	13	33%	2	5%	9	23%	15	38%	24	60%	40
2005-2010	25	42%	9	15%	24	40%	32	53%	24	40%	60
2011-2016	28	47%	17	28%	29	48%	38	63%	19	32%	60
Total	66	41%	28	18%	62	39%	85	53%	67	42%	160
Chi-square	2.0		9.5**		6.8*		6.4*		8.1*		
Transportation	26	43%	11	18%	27	45%	32	53%	22	37%	60
Power	13	48%	10	37%	13	48%	19	70%	8	30%	27
Water resource	9	33%	5	19%	9	33%	12	44%	15	56%	27
Regional development	10	40%	1	4%	8	32%	12	48%	12	48%	25
Pollution control	5	45%	0	0%	3	27%	5	45%	5	45%	11
Agriculture	3	30%	1	10%	2	20%	5	50%	5	50%	10
Total	66	41%	28	18%	62	39%	85	53%	67	42%	160
Chi-square	2.0		13.1*		4.9		4.6		5.1		

Note: The sum of all five totals does not match with the total number of reports. Some reports have two issues or more.

The introduction of JICA guidelines in 2004 and 2010 could increase the number of biodiversity criteria for alternatives analysis. But the portion is still low. There is a considerable gap by sector.

# QTA results of mitigation measures

Period and sector	Environmental issues		Biodiversity issues		Social issues		Economic issues		No mitigation		Total
2001-2004	32	80%	21	53%	31	78%	17	43%	4	10%	40
2005-2010	46	77%	30	50%	44	73%	34	57%	11	18%	60
2011-2016	51	85%	31	52%	45	75%	28	47%	8	13%	60
Total	129	81%	82	51%	120	75%	79	49%	23	14%	160
Chi-square		1.3		0.1		0.2		2.2		1.4	
Transportation	50	83%	30	50%	45	75%	28	47%	8	13%	60
Power	21	78%	18	67%	20	74%	16	59%	3	11%	27
Water resource	22	81%	15	56%	20	74%	11	41%	5	19%	27
Regional development	18	72%	7	28%	18	72%	13	52%	4	16%	25
Pollution control	9	82%	5	45%	9	82%	5	45%	2	18%	11
Agriculture	9	90%	7	70%	8	80%	6	60%	1	10%	10
Total	129	81%	82	51%	120	75%	79	49%	23	14%	160
Chi-square		2.2		9.7		0.6		2.6		1.0	

Note: The sum of all five totals does not match with the total number of reports. Some reports have two issues or more.

The portion of biodiversity remains unchanged over the passage of time. There is no significant difference between sectors. The portion in regional development is low (28%).

# Biodiversity mitigation hierarchy

Group	Avoidance		Minimization		Compensation		Total
2001-2004	1	5%	13	62%	13	62%	21
2005-2010	4	13%	13	41%	16	50%	32
2011-2016	4	11%	27	75%	16	44%	36
Total	9	10%	53	60%	45	51%	89
Chi-square	0.9		8.4*		1.6		

Group	Avoidance		Minimization		Compensation		Total
Both processes	2	10%	15	71%	12	57%	21
Only alternatives	1	14%	2	29%	0	0%	7
Only mitigations	6	10%	36	59%	33	54%	61
Total	9	10%	53	60%	45	51%	89
Chi-square	0.1		4.0		7.8*		

The avoidance is scarce. There is no difference between both process (alternatives and mitigations) and only mitigations. Alternatives could not function well to avoid and minimize adverse impacts.

# Biodiversity mitigation hierarchy and public involvement

Groups	Avoidance		Minimization		Compensation		Total
PI0	3	9%	20	63%	18	56%	32
PI1	4	17%	15	63%	11	46%	24
PI2	1	5%	11	55%	8	40%	20
PI3	1	8%	7	54%	8	62%	13
Total	9	10%	53	60%	45	51%	89
Chi-square	1.8		0.6		2.1		

Note: PI0: no public involvement, PI1: public involvement at draft reporting stage, PI2: public involvement at scoping and draft reporting stages, PI3: public involvement at stages of scoping, draft reporting, and the intermediate stage between scoping and draft reporting.

There was no difference in mitigation hierarchy with or without public involvement.

# Biodiversity mitigation hierarchy

Avoidance	Minimization	Compensation
Ecosystem (2)	Deforestation(19)	Reforestation (24)
Habitat of endangered species(2)	Ecosystem (10)	Migration of endangered species (10)
Protected area (2)	Selection of an alternative having less impact (8)	Vegetation (7)
Selection of an alternative having no impact (1)	Maintaining water flow (7)	Corridors (5)
Water resource (1)	Endangered species (5)	Fish ladders (4)
Wetlands (1)	Mangrove trees (3)	Restoration of feeding area (2)
	Protected area (2)	Artificial seashore (1)
	Wetlands (2)	Coral transplantation (1)
	Wildlife (2)	Endangered plant transplantation (1)
	Bird strike (1)	Mangrove transplantation (1)
	Habitat (1)	Restoration of wetlands (1)
	Poaching (1)	
	Reef (1)	
	Road kill (1)	
	Vegetation (1)	

Only nine projects selected alternatives to avoid or minimize adverse impacts. Main mitigation measures were minimization of deforestation and reforestation. There was no information about locations, areas, number and species of trees, and costs.

# Discussions 1

1. Weak consideration of alternatives and poor effects of public involvement;
2. Application of green infrastructure to prepare reasonable alternatives to mitigate the adverse impacts on biodiversity and to make wise use of ecosystem services;
3. Eco-DRR (Ecosystem-based disaster risk reduction) is one good option to start green infrastructure;

# Discussions 2

4. Application of mitigation hierarchy to motivate proponents to increase a portion of avoidance and minimization; and
5. Discussion of alternatives with stakeholders including ecosystem service beneficiaries.

# Conclusions

1. Alternatives and public involvement are not effective for biodiversity mitigation measures;
2. Application of green infrastructure and mitigation hierarchy to prepare alternatives to avoid and minimize impacts on biodiversity;
3. Discussion of alternatives with ecosystem service beneficiaries to select a good alternative.



# Thank you for your attention.

Tetsuya Kamijo (Kamijo.Tetsuya@jica.go.jp)