Country Report of Thailand: Evolution of SWDS methane emission estimate

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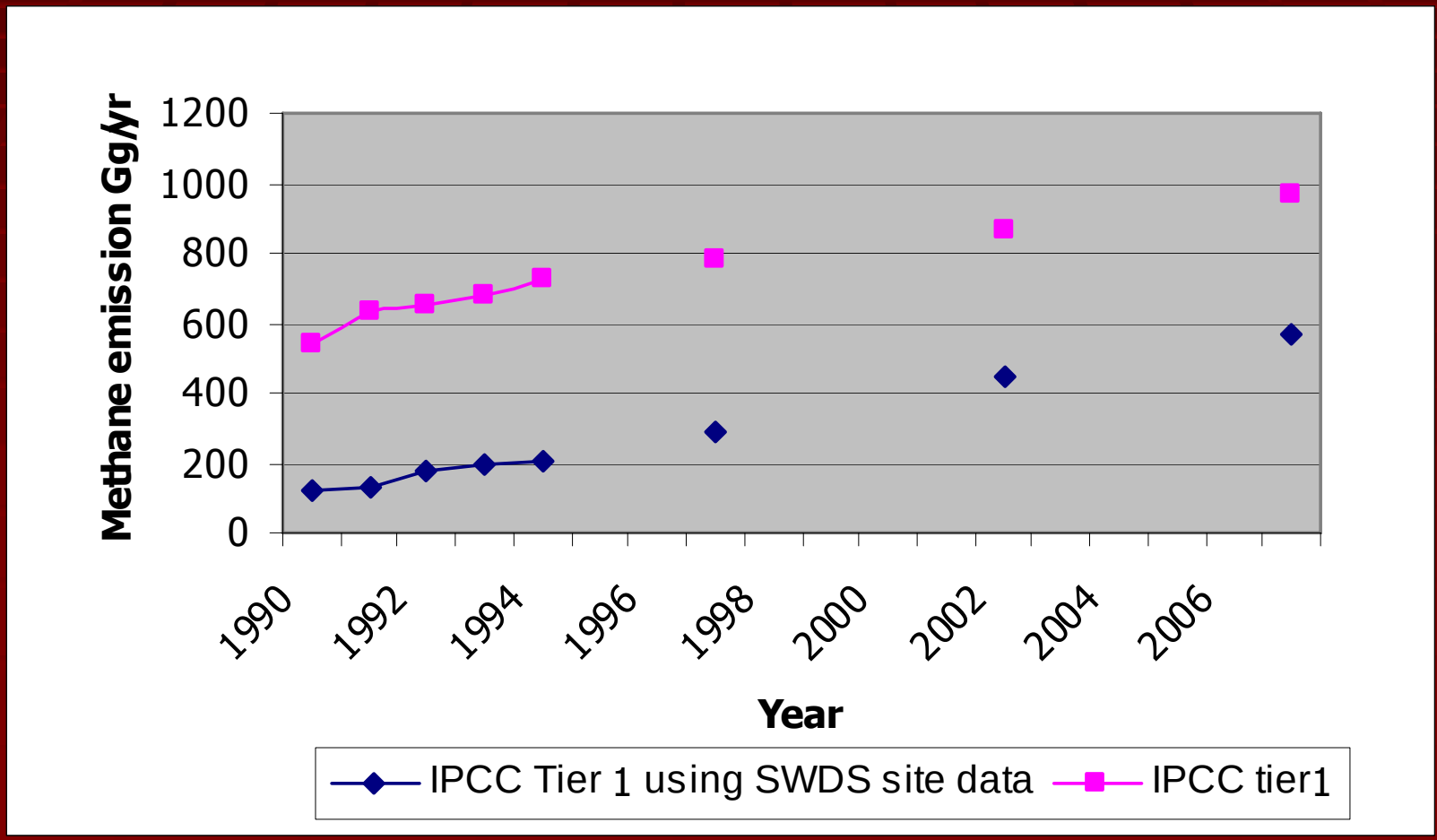
Content

- Historical record of GHG emission from SWDS
- Improving of activity data
- Improving of emission factor
- Study of k value

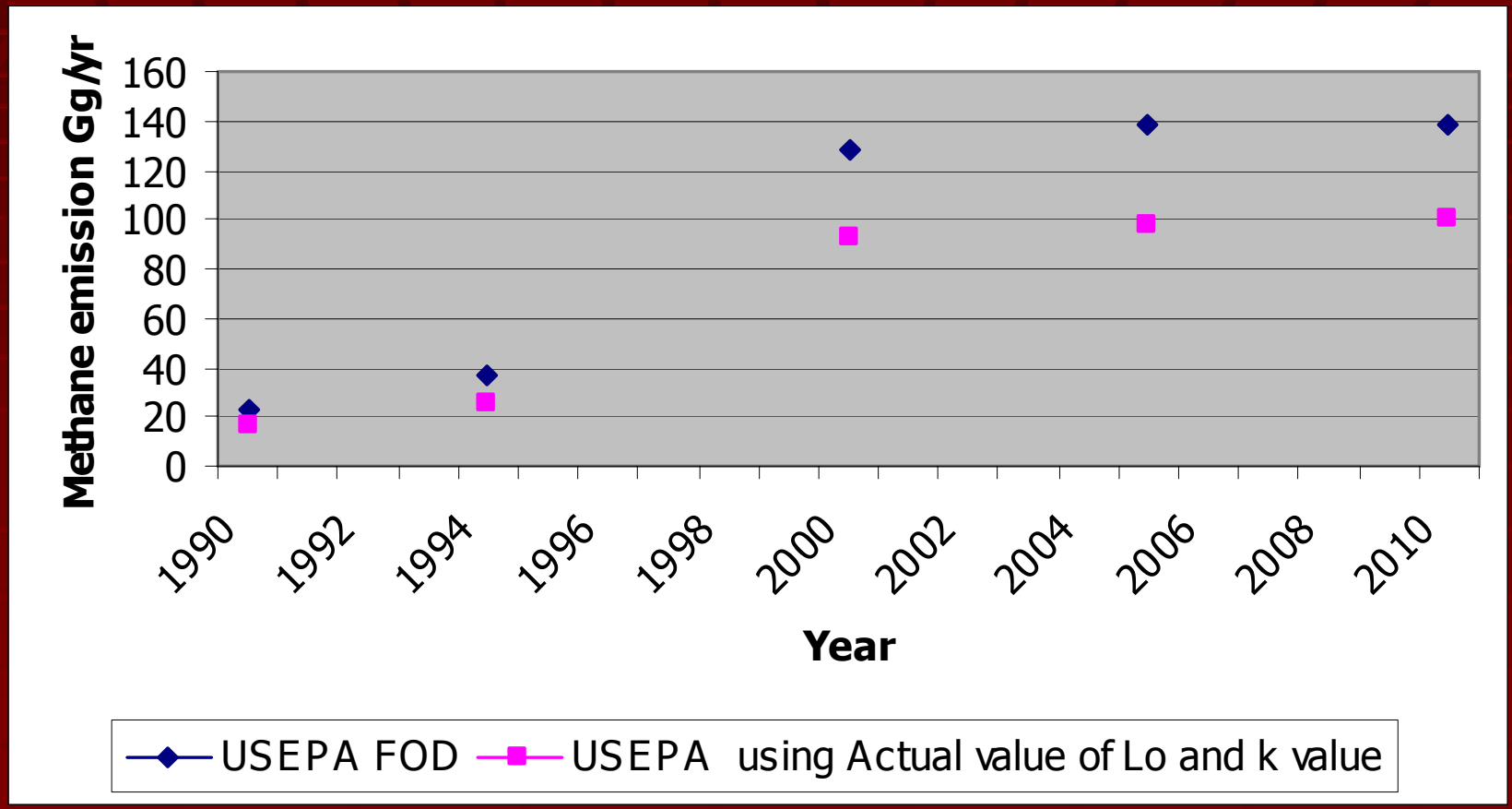
Comparison of methane emission from SWDS using IPCC tier 1

Report in Algas Project and first NC



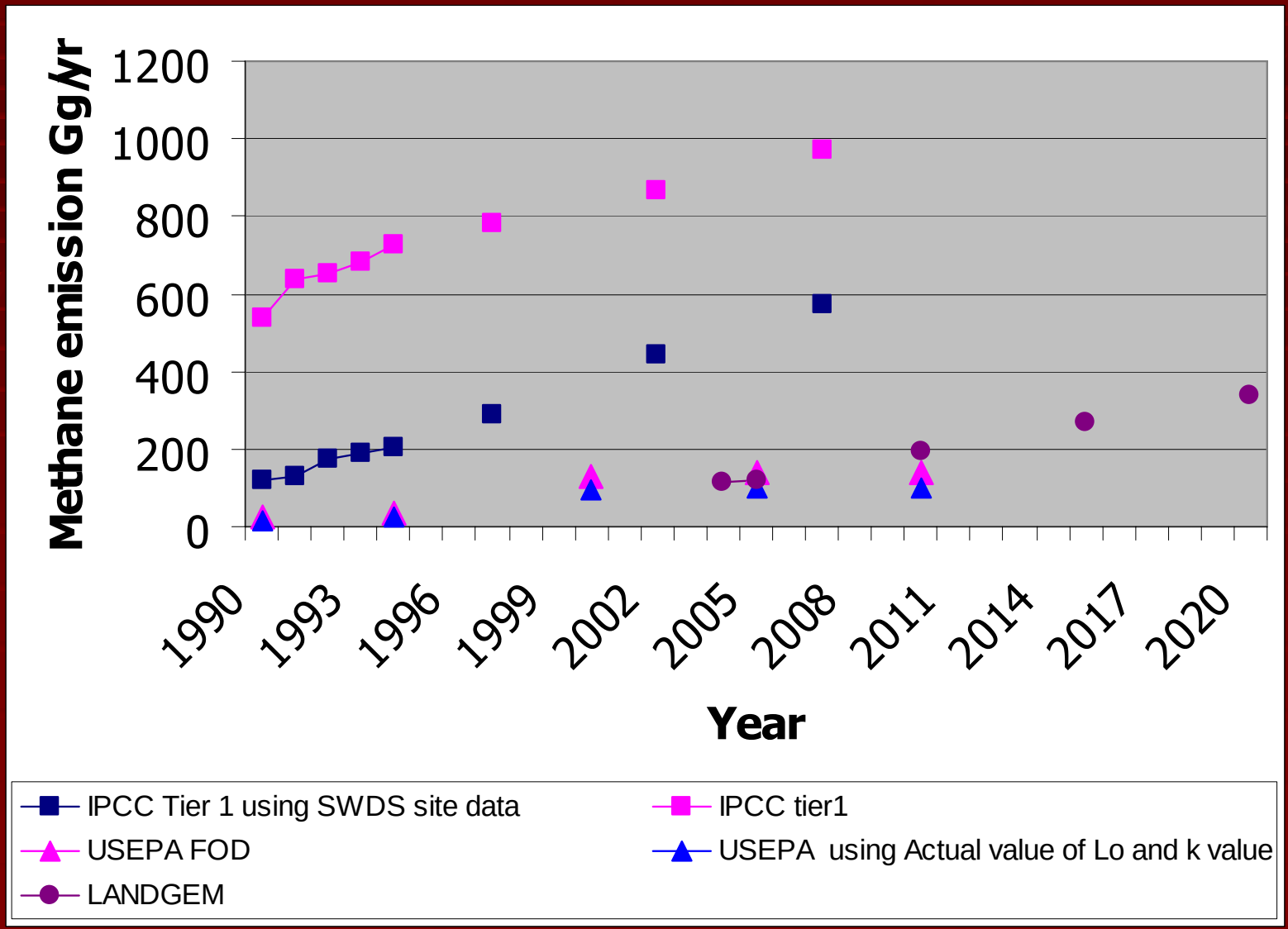
Towprayoon 1995

Methane emission from SWDS using USEPA model

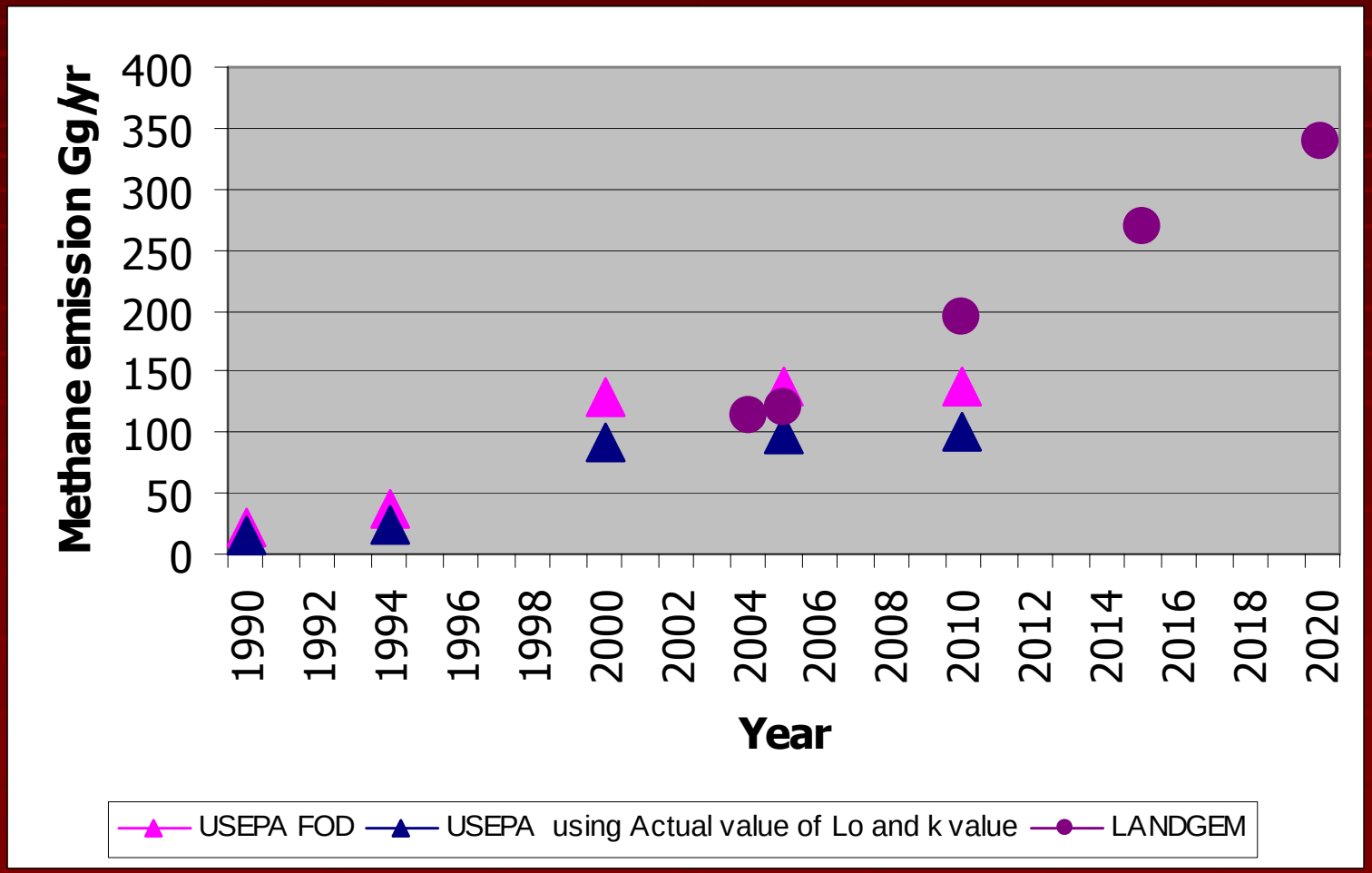


Masniyoom and Towprayoon 1996

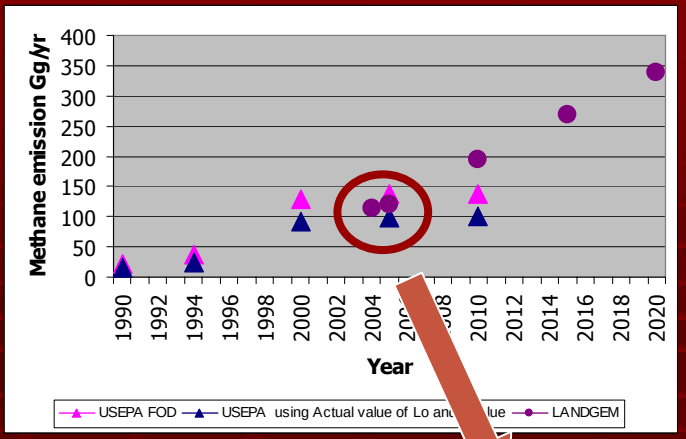
Comparison of Methane emission from SWDS using Tier 1 and FOD method



Emission from FOD method



1 Masniyoom and Towprayoon 1996, 2 Kornboonraksa et al 2004

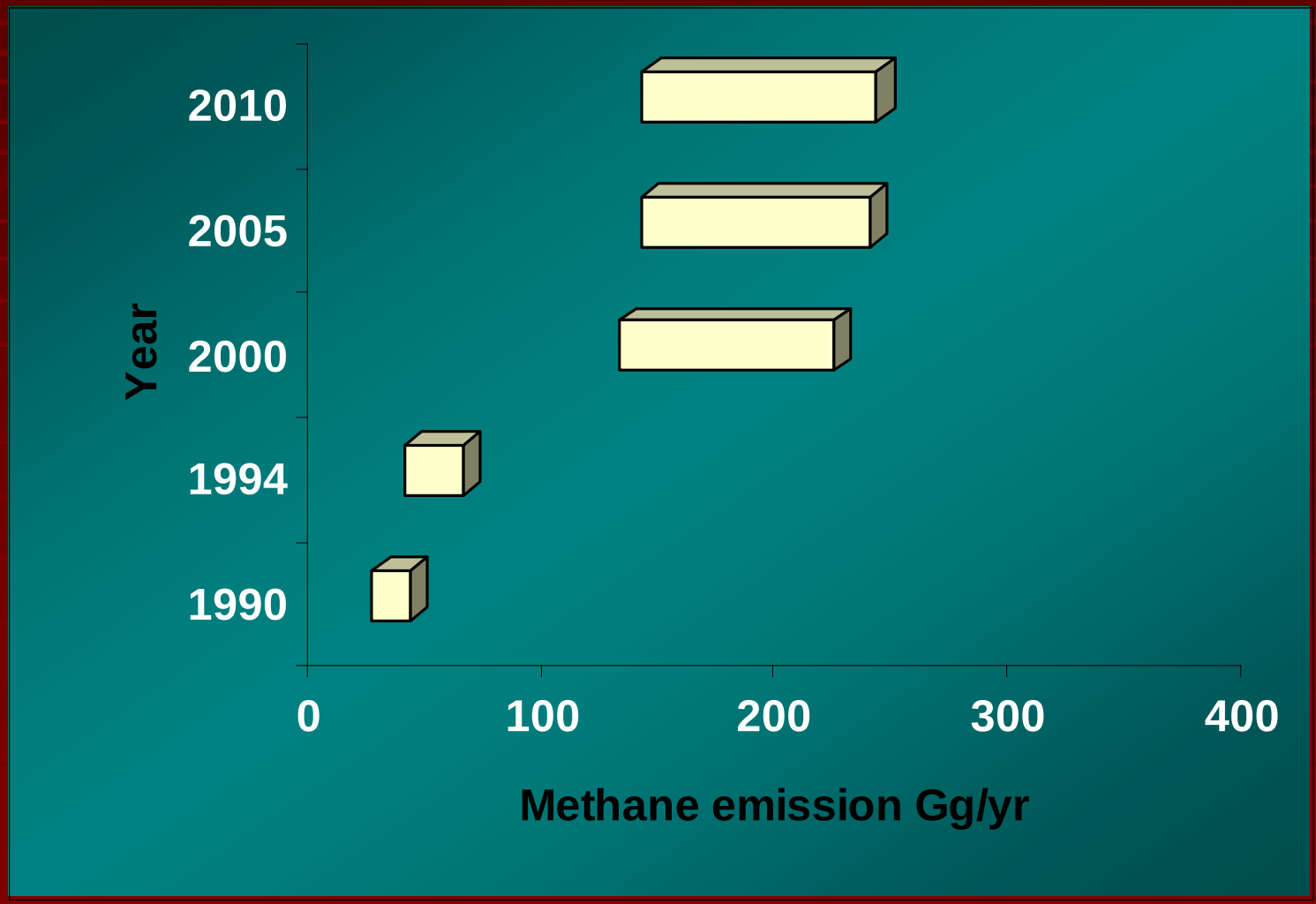


Comparison of Methane emission from SWDS Using FOD method with local value (Gg/yr)

Method	2004	2005
US EPA with default value [1]	138.4	138.5
USEPA with local Lo and k value [1]	97.3	
Land GEM [2]	114.2	
FOD with value from field measurement (close flux chamber) [2]	103,1	
IPCC method (Tier 1) [2]	366.0	

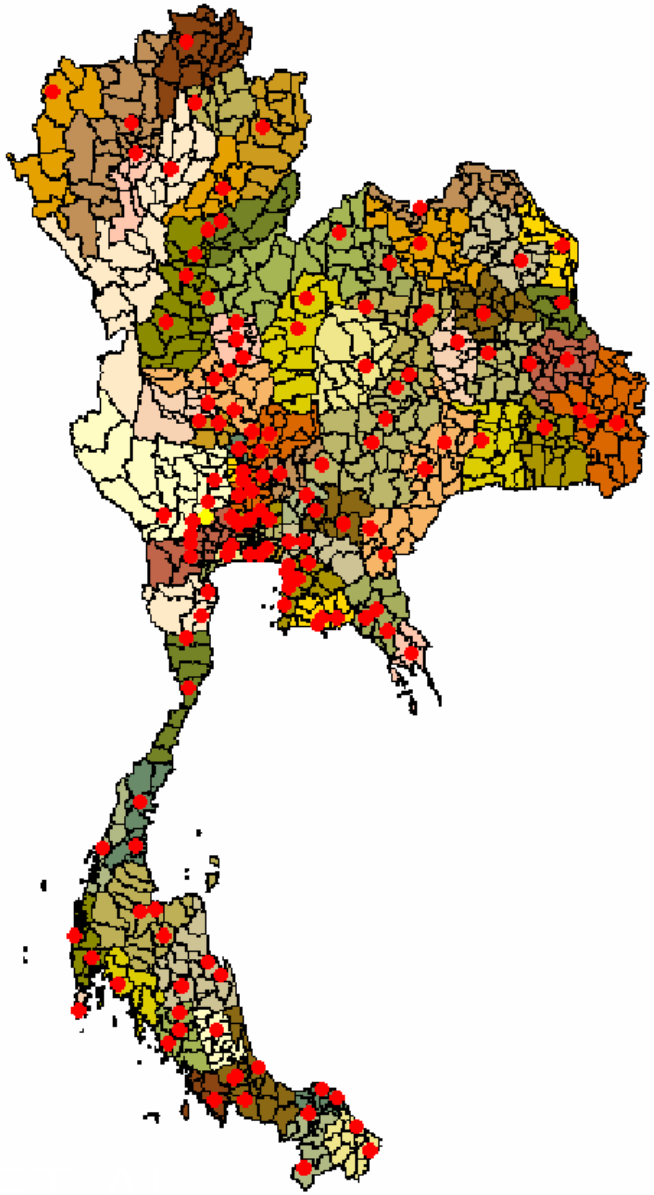
1 Masniyoom and Towprayoon 1996, 2 Kornboonraksa et al 2004

Range of different emission



Improving activity data acquisitions

- More data details are studied and collected
- Increase numbers of landfill sites and basic data achieved
- Waste generation and waste generation rates are more precise at sub-district level
- More accuracy estimation is expected



Location of waste disposal site in Thailand

CHARTERPAL

Waste generation and waste generation rate

Area	Population	Waste generation (tons/day)	Waste generation rate (kg/cap/day)
1 Bangkok	5,844,607	9,350	1.6
2. City and Pattaya	12,203,425	14,661	1.2
2.1 Central- Western region	3,585,595	4,650	1.3
2.2 Northen region	2,264,406	2,825	1.25
2.3 North-east region	3,239,281	3,134	0.97
2.4 Eastern region	1,246,151	1,901	1.53
2.4 Southern region	1,867,992	2,151	1.15
3. Outside City	44,871,653	17,930	0.4
	63,655,458	**41,941**	**0.66**

Improving Emission Factor

- Waste composition has been investigated and archived as database at sub-district level
- DOC by each site is available
- Study of k value has been done
- More accuracy estimation is expected

Province

Sub-district

Waste composition

จังหวัด	ชื่อเทศบา	องค์ประกอบของขย	ูลฝอย(ร้อยละโดยน้ำหนัก)								
		เศษอาหา	กระดาษ	พลาสติก	แก้ว	โลหะ	ยาง/หนัง	ผ้า	ไม้/ใบไม้	หิน/กระเบื้อ	อื่นๆ
อุดรธานี	24. ทต.นางัว		–	–	–	–	–	–	–	–	–
	25. ทต. เพ็ญ	5.00	16.00	15.00	3.00	10.00	2.00	2.00	43.00	3.00	1.00
	26. ทต. หนองอ้อ–โนนหวาย	25.00	5.00	15.00	20.00	5.00	5.00	5.00	10.00	5.00	5.00
	27. ทต. ไชยวาน	28.00	18.00	20.00	7.00	5.00	2.00	2.00	15.00	2.00	1.00
	28. ทต. บ้านเชียง	0.00	10.00	20.00	3.00	2.00	5.00	10.00	50.00	0.00	0.00
	29. ทต.กุดจับ	10.00	3.00	5.00	2.00	5.00	4.00	1.00	50.00	10.00	10.00
	30. ทต. ตาลเลียน	50.00	10.00	5.00	5.00	3.00	2.00	5.00	15.00	0.00	5.00
เฉลี่ย		24.89	14.81	15.07	6.83	4.17	2.86	3.11	19.64	2.61	6.02

Average

Waste Composition database

Fraction of DOC represented in Bangkok and other provinces

Component	*Bangkok Metropolitan*		*Other Province*	
	Percent of each component	Percent of DOC in MSW*	Percent of each component	Percent of DOC in MSW*
Paper	16.5	6.6	13.57	5.43
Food	13.5	2.04	45.34	6.8
Cloth	4.6	1.84	1.54	0.62
Wood&Yard Waste	6	1.8	5.03	1.51
Other non organic component	59.4	-	34.52	-
Total	100	**12.28**	100	**14.36**

Fraction of DOC from various landfill site

Site	Food	Paper	Textile	Green waste	Plastic	Bone	Rubber	Metal	Glass	Rock & Ceramic	DOC
Pattaya	39.99	14.06	3.54	4.6	15.95		3.17	3.55	9.1	3.03	0.148
Cha-Am	63.8	5.62	2.12	12.81	8.36		0.22	1.41	1.56	0	0.168
Nakornpathom	37.37	14.74	11.48	9.6	22.11	2.57	1.1	0	0.34	0	0.190
Hua-Hin	48.36	31.77	0.97	0.18	17.12	1.23	0.02	0.35	0	0	0.213
Nontaburi	43.97	18.67	0.52	1.14	31.75		0.79	0.32	1.33	1.51	0.154
Klongsuan	55	15		10	15				5		0.176
Rayong	48.73	18.03	0.41	0.1	17.27		0.1	0.88	10.51		0.156
Samutprakan	54.97	19.63	5.24	9.16	10.47			0.52			0.213
Lamchbang	39	19.33	13.84	3.43	14.66		1.63	2.43	1.94	1.84	0.206
Mabtaput	44	17.45	4.65	4.1	15.61		0.6	1.41	7.81	1.47	0.172
Nakornsawan	79.79	4.07	0.41	0.3	13.17		0.28	0.36	0.81		0.154
Pathumthani	69	6.46	2.72		13.95		0.36	0.71	5.53		0.154

DOC range from 0.148-0.213

Study of K value

- Seasonal variation
- Type of landfill
- Age of landfill

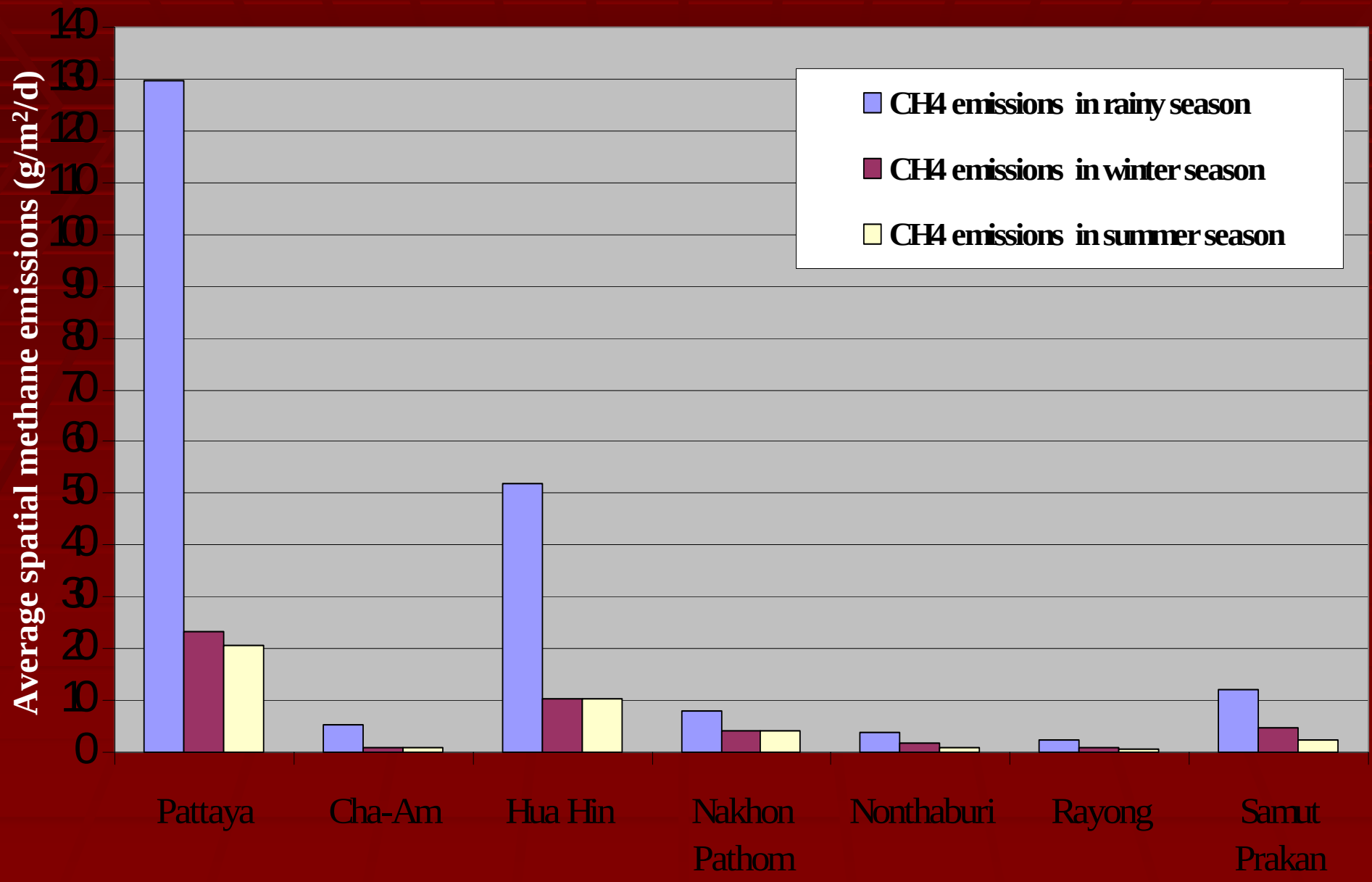
Seasonal variation

Site	Open Year	Site Age (yr)	Landfilling Condition	Average spatial methane emissions ($g/m^2/d$)				Methane emission	k (yr-1)
				Rainy	**Winter**	**Summer**	**All**		
Pattaya	2002	4	Managed - Deep	129.8	23.4	20.69	75.92	1,485.75	0.073
Mabtapud	2001	5	Managed - Deep	104.47	16.07	20.79	61.45	153.01	0.016
Cha-Am	2000	6	Managed - Shallow	5.45	1.00	0.99	3.22	56.08	0.018
Laemchabang	1999	7	Managed - Deep	135.73	22.99	24.90	79.84	2,074.87	0.21
Pathumtani	1998	8	Managed - Deep	16.07	2.87	2.80	9.45	154.57	0.0054
Nakornprathom	1997	9	Unmanaged - Deep	7.89	4.17	3.98	5.98	106.52	0.0034
Hua-Hin	1996	10	Managed - Deep	57.79	10.31	10.18	34.02	548.31	0.063
Nontaburi	1985	21	Unmanaged - Deep	3.94	1.64	0.77	2.57	63.26	0.0002
Klongsuan	1993	13	Unmanaged - Shallow	N.D.	N.D.	N.D.	N.D.	N.D.	-
Rayong	2001	5	Unmanaged - Shallow	2.44	1.00	0.55	1.61	20.65	0.007
Samutprakan 1	1999	7	Unmanaged - Deep	12.21	4.82	2.39	7.91	73.89	0.0069
Samutprakan 2	1992	14	Unmanaged - Shallow	N.D.	N.D.	N.D.	N.D.	N.D.	-

* Value from calculation

Methane Emission in Rainy Season = 2.83 * (Methane Emission in Winter Season + Summer Season)

Seasonal variation of methane emissions



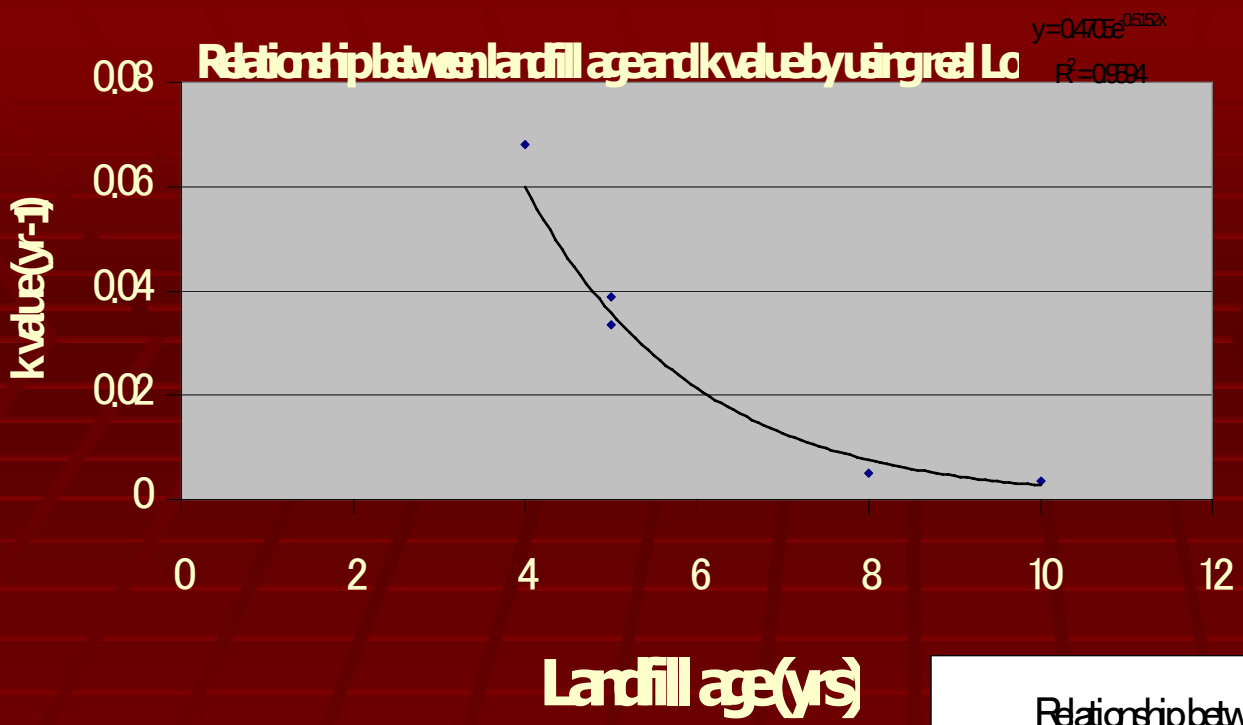
K value by type of Landfill

Type of landfill	Site	Open year	Age (yr)	Average landfilling tpd	MCF	DOC	Lo	k
Managed - Deep	Pattaya	2002	3	239.63	1	0.1487	106.96	0.073
	Hua-Hin	1996	9	45.51	1	0.2136	153.59	0.063
	Lamchabung	1999	6	120.00	1	0.2067	148.64	0.21
	Mabtaput	2001	4	60.00	1	0.1724	124.00	0.016
	Rachathewa	2000	5	3,500.00	1		107.3	0.162
Managed - Shallow	Cha-Am	2000	5	26.36	1	0.1682	120.99	0.018
Unmanaged - Deep	Nakornprathom	1997	8	180.00	0.8	0.1900	109.31	0.0034
	Nontaburi	1985	20	850.00	0.8	0.1541	88.64	0.002
	Samutprakan 1	1999	6	80.00	0.8	0.2135	122.85	0.0069
Unmanaged-Shallow	Klongsuan	1993	12	3.50	0.4	0.1760	50.63	ND
	Rayong	2001	4	69.11	0.4	0.1568	45.11	0.007

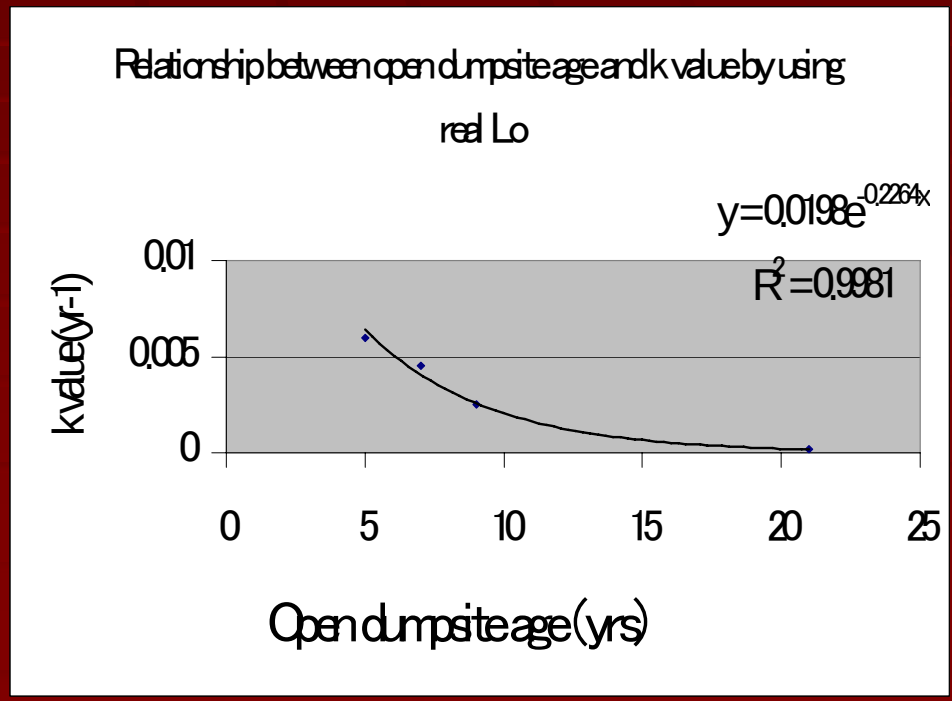
Manage-Deep 0.016-0.21

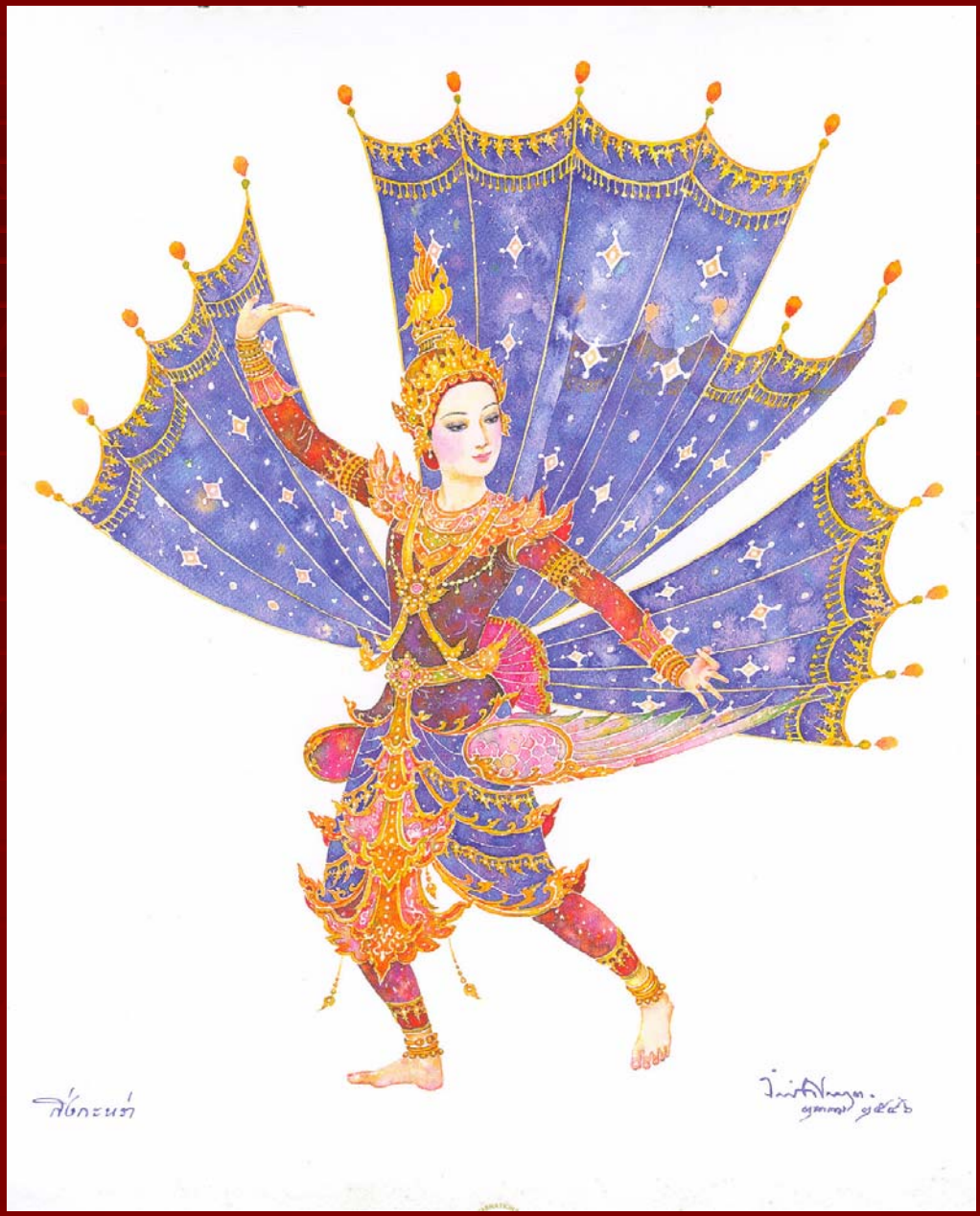
Managed-shallow 0.018

Unmanaged ND – 0.007



K value and site age





Thank you for your attention
And
Sawasdee Ka