


**MEASURING URBAN SUSTAINABILITY:  
CANADIAN INDICATORS WORKSHOP**

**JUNE 19-21, 1995**

**WORKSHOP PROCEEDINGS**

HT  
243  
.C3  
C2513  
1995

**CMHC SCHL**  
Helping to house Canadians

 Environment Canada    Environnement Canada

Canada

**MEASURING URBAN SUSTAINABILITY:  
CANADIAN INDICATORS WORKSHOP**

**JUNE 19-21, 1995**

**WORKSHOP PROCEEDINGS**

Environment Canada Library  
5204 - 50th Avenue, Suite 301  
YELLOWKNIFE, NT X1A 1E2

*Prepared By:*

**David Dilks, LURA Group - Toronto**

*For:*

**State of the Environment Directorate, Environment Canada**

**Centre for Futures Studies in Housing and Living Environments,  
Canada Mortgage and Housing Corporation**

*Ce document est aussi disponible en français sous le titre  
Mesure de la durabilité urbaine: atelier sur les indicateurs au Canada*

January 1996

**Additional copies of this report are available from:**

Canadian Housing Information Centre  
Canada Mortgage and Housing Corporation  
700 Montreal Road  
Ottawa, Ontario  
K1A 0P7

telephone: (613) 748-2367  
facsimile: (613) 748-4069

1988-1989-1990-1991  
7-11-13-15-17-19-21-23-25-27-29-31-33-35-37-39-41-43-45-47-49-51-53-55-57-59-61-63-65-67-69-71-73-75-77-79-81-83-85-87-89-91-93-95-97-99-101-103-105-107-109-111-113-115-117-119-121-123-125-127-129-131-133-135-137-139-141-143-145-147-149-151-153-155-157-159-161-163-165-167-169-171-173-175-177-179-181-183-185-187-189-191-193-195-197-199-201-203-205-207-209-211-213-215-217-219-221-223-225-227-229-231-233-235-237-239-241-243-245-247-249-251-253-255-257-259-261-263-265-267-269-271-273-275-277-279-281-283-285-287-289-291-293-295-297-299-301-303-305-307-309-311-313-315-317-319-321-323-325-327-329-331-333-335-337-339-341-343-345-347-349-351-353-355-357-359-361-363-365-367-369-371-373-375-377-379-381-383-385-387-389-391-393-395-397-399-401-403-405-407-409-411-413-415-417-419-421-423-425-427-429-431-433-435-437-439-441-443-445-447-449-451-453-455-457-459-461-463-465-467-469-471-473-475-477-479-481-483-485-487-489-491-493-495-497-499-501-503-505-507-509-511-513-515-517-519-521-523-525-527-529-531-533-535-537-539-541-543-545-547-549-551-553-555-557-559-561-563-565-567-569-571-573-575-577-579-581-583-585-587-589-591-593-595-597-599-601-603-605-607-609-611-613-615-617-619-621-623-625-627-629-631-633-635-637-639-641-643-645-647-649-651-653-655-657-659-661-663-665-667-669-671-673-675-677-679-681-683-685-687-689-691-693-695-697-699-701-703-705-707-709-711-713-715-717-719-721-723-725-727-729-731-733-735-737-739-741-743-745-747-749-751-753-755-757-759-761-763-765-767-769-771-773-775-777-779-781-783-785-787-789-791-793-795-797-799-801-803-805-807-809-811-813-815-817-819-821-823-825-827-829-831-833-835-837-839-841-843-845-847-849-851-853-855-857-859-861-863-865-867-869-871-873-875-877-879-881-883-885-887-889-891-893-895-897-899-901-903-905-907-909-911-913-915-917-919-921-923-925-927-929-931-933-935-937-939-941-943-945-947-949-951-953-955-957-959-961-963-965-967-969-971-973-975-977-979-981-983-985-987-989-991-993-995-997-999-1001-1003-1005-1007-1009-1011-1013-1015-1017-1019-1021-1023-1025-1027-1029-1031-1033-1035-1037-1039-1041-1043-1045-1047-1049-1051-1053-1055-1057-1059-1061-1063-1065-1067-1069-1071-1073-1075-1077-1079-1081-1083-1085-1087-1089-1091-1093-1095-1097-1099-1101-1103-1105-1107-1109-1111-1113-1115-1117-1119-1121-1123-1125-1127-1129-1131-1133-1135-1137-1139-1141-1143-1145-1147-1149-1151-1153-1155-1157-1159-1161-1163-1165-1167-1169-1171-1173-1175-1177-1179-1181-1183-1185-1187-1189-1191-1193-1195-1197-1199-1201-1203-1205-1207-1209-1211-1213-1215-1217-1219-1221-1223-1225-1227-1229-1231-1233-1235-1237-1239-1241-1243-1245-1247-1249-1251-1253-1255-1257-1259-1261-1263-1265-1267-1269-1271-1273-1275-1277-1279-1281-1283-1285-1287-1289-1291-1293-1295-1297-1299-1301-1303-1305-1307-1309-1311-1313-1315-1317-1319-1321-1323-1325-1327-1329-1331-1333-1335-1337-1339-1341-1343-1345-1347-1349-1351-1353-1355-1357-1359-1361-1363-1365-1367-1369-1371-1373-1375-1377-1379-1381-1383-1385-1387-1389-1391-1393-1395-1397-1399-1401-1403-1405-1407-1409-1411-1413-1415-1417-1419-1421-1423-1425-1427-1429-1431-1433-1435-1437-1439-1441-1443-1445-1447-1449-1451-1453-1455-1457-1459-1461-1463-1465-1467-1469-1471-1473-1475-1477-1479-1481-1483-1485-1487-1489-1491-1493-1495-1497-1499-1501-1503-1505-1507-1509-1511-1513-1515-1517-1519-1521-1523-1525-1527-1529-1531-1533-1535-1537-1539-1541-1543-1545-1547-1549-1551-1553-1555-1557-1559-1561-1563-1565-1567-1569-1571-1573-1575-1577-1579-1581-1583-1585-1587-1589-1591-1593-1595-1597-1599-1601-1603-1605-1607-1609-1611-1613-1615-1617-1619-1621-1623-1625-1627-1629-1631-1633-1635-1637-1639-1641-1643-1645-1647-1649-1651-1653-1655-1657-1659-1661-1663-1665-1667-1669-1671-1673-1675-1677-1679-1681-1683-1685-1687-1689-1691-1693-1695-1697-1699-1701-1703-1705-1707-1709-1711-1713-1715-1717-1719-1721-1723-1725-1727-1729-1731-1733-1735-1737-1739-1741-1743-1745-1747-1749-1751-1753-1755-1757-1759-1761-1763-1765-1767-1769-1771-1773-1775-1777-1779-1781-1783-1785-1787-1789-1791-1793-1795-1797-1799-1801-1803-1805-1807-1809-1811-1813-1815-1817-1819-1821-1823-1825-1827-1829-1831-1833-1835-1837-1839-1841-1843-1845-1847-1849-1851-1853-1855-1857-1859-1861-1863-1865-1867-1869-1871-1873-1875-1877-1879-1881-1883-1885-1887-1889-1891-1893-1895-1897-1899-1901-1903-1905-1907-1909-1911-1913-1915-1917-1919-1921-1923-1925-1927-1929-1931-1933-1935-1937-1939-1941-1943-1945-1947-1949-1951-1953-1955-1957-1959-1961-1963-1965-1967-1969-1971-1973-1975-1977-1979-1981-1983-1985-1987-1989-1991-1993-1995-1997-1999-2001-2003-2005-2007-2009-2011-2013-2015-2017-2019-2021-2023-2025-2027-2029-2031-2033-2035-2037-2039-2041-2043-2045-2047-2049-2051-2053-2055-2057-2059-2061-2063-2065-2067-2069-2071-2073-2075-2077-2079-2081-2083-2085-2087-2089-2091-2093-2095-2097-2099-2101-2103-2105-2107-2109-2111-2113-2115-2117-2119-2121-2123-2125-2127-2129-2131-2133-2135-2137-2139-2141-2143-2145-2147-2149-2151-2153-2155-2157-2159-2161-2163-2165-2167-2169-2171-2173-2175-2177-2179-2181-2183-2185-2187-2189-2191-2193-2195-2197-2199-2201-2203-2205-2207-2209-2211-2213-2215-2217-2219-2221-2223-2225-2227-2229-2231-2233-2235-2237-2239-2241-2243-2245-2247-2249-2251-2253-2255-2257-2259-2261-2263-2265-2267-2269-2271-2273-2275-2277-2279-2281-2283-2285-2287-2289-2291-2293-2295-2297-2299-2301-2303-2305-2307-2309-2311-2313-2315-2317-2319-2321-2323-2325-2327-2329-2331-2333-2335-2337-2339-2341-2343-2345-2347-2349-2351-2353-2355-2357-2359-2361-2363-2365-2367-2369-2371-2373-2375-2377-2379-2381-2383-2385-2387-2389-2391-2393-2395-2397-2399-2401-2403-2405-2407-2409-2411-2413-2415-2417-2419-2421-2423-2425-2427-2429-2431-2433-2435-2437-2439-2441-2443-2445-2447-2449-2451-2453-2455-2457-2459-2461-2463-2465-2467-2469-2471-2473-2475-2477-2479-2481-2483-2485-2487-2489-2491-2493-2495-2497-2499-2501-2503-2505-2507-2509-2511-2513-2515-2517-2519-2521-2523-2525-2527-2529-2531-2533-2535-2537-2539-2541-2543-2545-2547-2549-2551-2553-2555-2557-2559-2561-2563-2565-2567-2569-2571-2573-2575-2577-2579-2581-2583-2585-2587-2589-2591-2593-2595-2597-2599-2601-2603-2605-2607-2609-2611-2613-2615-2617-2619-2621-2623-2625-2627-2629-2631-2633-2635-2637-2639-2641-2643-2645-2647-2649-2651-2653-2655-2657-2659-2661-2663-2665-2667-2669-2671-2673-2675-2677-2679-2681-2683-2685-2687-2689-2691-2693-2695-2697-2699-2701-2703-2705-2707-2709-2711-2713-2715-2717-2719-2721-2723-2725-2727-2729-2731-2733-2735-2737-2739-2741-2743-2745-2747-2749-2751-2753-2755-2757-2759-2761-2763-2765-2767-2769-2771-2773-2775-2777-2779-2781-2783-2785-2787-2789-2791-2793-2795-2797-2799-2801-2803-2805-2807-2809-2811-2813-2815-2817-2819-2821-2823-2825-2827-2829-2831-2833-2835-2837-2839-2841-2843-2845-2847-2849-2851-2853-2855-2857-2859-2861-2863-2865-2867-2869-2871-2873-2875-2877-2879-2881-2883-2885-2887-2889-2891-2893-2895-2897-2899-2901-2903-2905-2907-2909-2911-2913-2915-2917-2919-2921-2923-2925-2927-2929-2931-2933-2935-2937-2939-2941-2943-2945-2947-2949-2951-2953-2955-2957-2959-2961-2963-2965-2967-2969-2971-2973-2975-2977-2979-2981-2983-2985-2987-2989-2991-2993-2995-2997-2999-3001-3003-3005-3007-3009-3011-3013-3015-3017-3019-3021-3023-3025-3027-3029-3031-3033-3035-3037-3039-3041-3043-3045-3047-3049-3051-3053-3055-3057-3059-3061-3063-3065-3067-3069-3071-3073-3075-3077-3079-3081-3083-3085-3087-3089-3091-3093-3095-3097-3099-3101-3103-3105-3107-3109-3111-3113-3115-3117-3119-3121-3123-3125-3127-3129-3131-3133-3135-3137-3139-3141-3143-3145-3147-3149-3151-3153-3155-3157-3159-3161-3163-3165-3167-3169-3171-3173-3175-3177-3179-3181-3183-3185-3187-3189-3191-3193-3195-3197-3199-3201-3203-3205-3207-3209-3211-3213-3215-3217-3219-3221-3223-3225-3227-3229-3231-3233-3235-3237-3239-3241-3243-3245-3247-3249-3251-3253-3255-3257-3259-3261-3263-3265-3267-3269-3271-3273-3275-3277-3279-3281-3283-3285-3287-3289-3291-3293-3295-3297-3299-3301-3303-3305-3307-3309-3311-3313-3315-3317-3319-3321-3323-3325-3327-3329-3331-3333-3335-3337-3339-3341-3343-3345-3347-3349-3351-3353-3355-3357-3359-3361-3363-3365-3367-3369-3371-3373-3375-3377-3379-3381-3383-3385-3387-3389-3391-3393-3395-3397-3399-3401-3403-3405-3407-3409-3411-3413-3415-3417-3419-3421-3423-3425-3427-3429-3431-3433-3435-3437-3439-3441-3443-3445-3447-3449-3451-3453-3455-3457-3459-3461-3463-3465-3467-3469-3471-3473-3475-3477-3479-3481-3483-3485-3487-3489-3491-3493-3495-3497-3499-3501-3503-3505-3507-3509-3511-3513-3515-3517-3519-3521-3523-3525-3527-3529-3531-3533-3535-3537-3539-3541-3543-3545-3547-3549-3551-3553-3555-3557-3559-3561-3563-3565-3567-3569-3571-3573-3575-3577-3579-3581-3583-3585-3587-3589-3591-3593-3595-3597-3599-3601-3603-3605-3607-3609-3611-3613-3615-3617-3619-3621-3623-3625-3627-3629-3631-3633-3635-3637-3639-3641-3643-3645-3647-3649-3651-3653-3655-3657-3659-3661-3663-3665-3667-3669-3671-3673-3675-3677-3679-3681-3683-3685-3687-3689-3691-3693-3695-3697-3699-3701-3703-3705-3707-3709-3711-3713-3715-3717-3719-3721-3723-3725-3727-3729-3731-3733-3735-3737-3739-3741-3743-3745-3747-3749-3751-3753-3755-3757-3759-3761-3763-3765-3767-3769-3771-3773-3775-3777-3779-3781-3783-3785-3787-3789-3791-3793-3795-3797-3799-3801-3803-3805-3807-3809-3811-3813-3815-3817-3819-3821-3823-3825-3827-3829-3831-3833-3835-3837-3839-3841-3843-3845-3847-3849-3851-3853-3855-3857-3859-3861-3863-3865-3867-3869-3871-3873-3875-3877-3879-3881-3883-3885-3887-3889-3891-3893-3895-3897-3899-3901-3903-3905-3907-3909-3911-3913-3915-3917-3919-3921-3923-3925-3927-3929-3931-3933-3935-3937-3939-3941-3943-3945-3947-3949-3951-3953-3955-3957-3959-3961-3963-3965-3967-3969-3971-3973-3975-3977-3979-3981-3983-3985-3987-3989-3991-3993-3995-3997-3999-4001-4003-4005-4007-4009-4011-4013-4015-4017-4019-4021-4023-4025-4027-4029-4031-4033-4035-4037-4039-4041-4043-4045-4047-4049-4051-4053-4055-4057-4059-4061-4063-4065-4067-4069-4071-4073-4075-4077-4079-4081-4083-4085-4087-4089-4091-4093-4095-4097-4099-4101-4103-4105-4107-4109-4111-4113-4115-4117-4119-4121-4123-4125-4127-4129-4131-4133-4135-4137-4139-4141-4143-4145-4147-4149-4151-4153-4155-4157-4159-4161-4163-4165-4167-4169-4171-4173-4175-4177-4179-4181-4183-4185-4187-4189-4191-4193-4195-4197-4199-4201-4203-4205-4207-4209-4211-4213-4215-4217-4219-4221-4223-4225-4227-4229-4231-4233-4235-4237-4239-4241-4243-4245-4247-4249-4251-4253-4255-4257-4259-4261-4263-4265-4267-4269-4271-4273-4275-4277-4279-4281-4283-4285-4287-4289-4291-4293-4295-4297-4299-4301-4303-4305-4307-4309-4311-4313-4315-4317-4319-4321-4323-4325-4327-4329-4331-4333-4335-4337-4339-4341-4343-4345-4347-4349-4351-4353-4355-4357-4359-4361-4363-4365-4367-4369-4371-4373-4375-4377-4379-4381-4383-4385-4387-4389-4391-4393-4395-4397-4399-4401-4403-4405-4407-4409-4411-4413-4415-4417-4419-4421-4423-4425-4427-4429-4431-4433-4435-4437-4439-4441-4443-4445-4447-4449-4451-4453-4455-4457-4459-4461-4463-4465-4467-4469-4471-4473-4475-4477-4479-4481-4483-4485-4487-4489-4491-4493-4495-4497-4499-4501-4503-4505-4507-4509-4511-4513-4515-4517-4519-4521-4523-4525-4527-4529-4531-4533-4535-4537-4539-4541-4543-4545-4547-4549-4551-4553-4555-4557-4559-4561-4563-4565-4567-4569-4571-4573-4575-4577-4579-4581-4583-4585-4587-4589-4591-4593-4595-4597-4599-4601-4603-4605-4607-4609-4611-4613-4615-4617-4619-4621-4623-4625-4627-4629-4631-4633-4635-4637-4639-4641-4643-4645-4647-4649-4651-4653-4655-4657-4659-4661-4663-4665-4667-4669-4671-4673-4675-4677-4679-4681-4683-4685-4687-4689-4691-4693-4695-4697-4699-4701-4703-4705-4707-4709-4711-4713-4715-4717-4719-4721-4723-4725-4727-4729-4731-4733-4735-4737-4739-4741-4743-4745-4747-4749-4751-4753-4755-4757-4759-4761-4763-4765-4767-4769-4771-4773-4775-4777-4779-4781-4783-4785-4787-4789-4791-4793-4795-4797-4799-4801-4803-4805-4807-4809-4811-4813-4815-4817-4819-4821-4823-4825-4827-4829-4831-4833-4835-4837-4839-4841-4843-4845-4847-4849-4851-4853-4855-4857-4859-4861-4863-4865-4867-4869-4871-4873-4875-4877-4879-4881-4883-4885-4887-4889-4891-4893-4895-4897-4899-4901-4903-4905-4907-4909-4911-4913-4915-4917-4919-4921-4923-4925-4927-4929-4931-4933-4935-4937-4939-4941-4943-4945-4947-4949-4951-4953-4955-4957-4959-4961-4963-4965-4967-4969-4971-4973-4975-4977-4979-4981-4983-4985-4987-4989-4991-4993-4995-4997-4999-5001-5003-5005-5007-5009-5011-5013-5015-5017-5019-5021-5023-5025-5027-5029-5031-5033-5035-5037-5039-5041-5043-5045-5047-5049-5051-5053-5055-5057-5059-5061-5063-5065-5067-5069-5071-5073-5075-5077-5079-5081-5083-50

## FOREWORD

In Canada, indicators are increasingly recognized as a key mechanism to encourage and measure progress toward sustainable urban development. When these are used to monitor the environmental, social and economic conditions in cities, the decision-making process is improved, as is policy and program evaluation. However, measuring progress on sustainable development at the urban level requires rethinking our approaches to information gathering and reporting.

Canada Mortgage and Housing Corporation (CMHC) and Environment Canada invited experts from municipalities, the provincial and federal governments and universities to participate in **Measuring Urban Sustainability: Canadian Indicators Workshop**. In this forum, they were able to discuss the successes and shortcomings of their current frameworks and approaches, and to begin charting a course for the future of urban sustainability indicators in Canada.

This report shows that progress was made on a number of fronts. Participants worked toward the identification of key characteristics of urban sustainability, determination of effective selection criteria for indicators, and the development of a usable list of common sustainability indicators. In addition, they made recommendations for the further development of urban sustainability indicators.

The success of the national workshop illustrates the strong interest of researchers, professionals and academics across Canada in developing better tools to monitor progress toward sustainable development objectives in our cities. CMHC, Environment Canada and other partners intend to use the findings of this workshop in the further development of a common, yet flexible approach to indicators development which Canadian urban areas could adopt.

Many individuals and organizations contributed to the workshop. We thank our host, the Municipality of Metropolitan Toronto, for the use of the Metro Hall facilities, and Environics Research Group Limited and the Office of the Greater Toronto Area for sponsoring workshop events. We acknowledge the important contribution of the chairpersons and rapporteurs who played a key role in facilitating the exchange of ideas and expertise. Most of all, we thank participants for their time, enthusiasm and willingness to openly share their valuable experiences and perspectives throughout the workshop.

Wayne Bond  
Co-Chair, Planning Committee  
Environment Canada

Denys Chamberland  
Co-Chair, Planning Committee  
Canada Mortgage and Housing Corporation

## **WORKSHOP PLANNING COMMITTEE**

### ***Canada Mortgage and Housing Corporation:***

Denys Chamberland (Co-Chair)

Debra Darke

Dick Leong

Jack Smugler

### ***Environment Canada:***

Wayne Bond (Co-Chair)

Heather Blenkiron

Anne Kerr

Ed Wiken

Dennis O'Farrell

## **REGISTRATION AND LOGISTICS COMMITTEE**

### ***Canada Mortgage and Housing Corporation:***

Mary Greenley  
Elizabeth Chollet  
Bob Stone

## **WORKSHOP CO-CHAIRPERSONS**

Robert W. Slater  
Assistant Deputy Minister  
Environmental Conservation Service  
Environment Canada

Douglas A. Stewart  
Vice-President  
Policy and Research  
Canada Mortgage and Housing Corporation

## **WORKSHOP RAPPORTEUR**

Sally Leppard  
President  
LURA Group



## TABLE OF CONTENTS

<b>1.</b>	<b>Background and Introduction .....</b>	<b>1</b>
1.1	Context .....	1
1.2	Canadian Indicators Workshop .....	4
<b>2.</b>	<b>Workshop Highlights: Key Observations, Recommendations and Conclusions .....</b>	<b>9</b>
<b>3.</b>	<b>A Base on Which to Build .....</b>	<b>13</b>
3.1	Canadian Experience in Indicator Development .....	13
3.2	Learning From What's Been Done Already .....	17
<b>4.</b>	<b>Defining Urban Sustainability .....</b>	<b>19</b>
4.1	Key Characteristics of Urban Sustainability .....	21
4.2	Important Issues in Achieving Urban Sustainability .....	24
<b>5.</b>	<b>Developing Urban Sustainability Indicators .....</b>	<b>25</b>
5.1	Indicator Frameworks .....	25
5.2	Indicator Selection Criteria .....	27
5.3	Towards a Common Set of Indicators .....	32
5.4	An Ongoing Process for Indicator Development .....	41
<b>6.</b>	<b>Exporting Our Knowledge .....</b>	<b>43</b>
6.1	Applicability of a Common Set of Canadian Indicators at the International Level .....	43
6.2	Canada's Role in the United Nations Centre for Human Settlements' Indicators Programme .....	44
<b>7.</b>	<b>Next Steps and Conclusions .....</b>	<b>47</b>
7.1	Participants' Recommendations for Next Steps .....	47
7.2	Co-Chairperson's Concluding Remarks .....	47
	<b>References .....</b>	<b>49</b>
	Appendix A: Workshop Program .....	51
	Appendix C: Issues in Developing Indicators of Urban Sustainability .....	59
	Appendix D: Selected Readings .....	67
	Appendix B: List of Workshop Participants/ Session Chairpersons/ Session Rapporteurs .....	71



## LIST OF FIGURES

Figure 1:	A Systems Perspective on Sustainable Communities .....	20
Figure 2:	Characteristics of Sustainability .....	22
Figure 3:	Urban Sustainability Indicators Evaluation Matrix .....	33

## LIST OF TABLES

Table 1:	Sample of Canadian Indicator Development Initiatives .....	4
Table 2:	Key Issues in Developing Indicators of Urban Sustainability .....	7
Table 3:	Components of a Liveable Metropolis .....	19
Table 4:	Potential Indicator Selection Criteria .....	28
Table 5:	Input on Indicator Selection Criteria .....	30
Table 6:	Master List of Indicators Proposed by Workshop Participants .....	37
Table 7:	List of Key UNCHS Indicators .....	45

# 1. Background and Introduction

## 1.1 Context

### *Urban Growth and Sustainability*

Throughout the world, cities are growing at a rapid pace. By the year 2000, it is estimated that 50 per cent of the global population will live in urban areas (WCED, 1987). This urban growth is putting increasing pressure on the environmental, social and economic conditions in cities and their environs. Issues such as environmental degradation, poverty, declining urban services, deterioration of infrastructure, and decreasing access to land and shelter are now major concerns in many urban areas.

As a result, many countries and international organizations are now looking closely at the environmental, social and economic sustainability of urban areas. This increasing focus on urban sustainability is based on the recognition that achieving the objectives of sustainable development at the global level will depend to a large extent on progress made toward healthy, "livable" urban communities.

Many different definitions of sustainable development and urban sustainability have been proposed and discussed since the publication of *Our Common Future* by the United Nations World Commission on Environment and Development (WCED), more commonly known as the Brundtland Commission. The WCED (1987) defined *sustainable development* as:

"...development that meets the needs of the present without compromising the ability of future generations to meet their own needs."

While there are many variations on how sustainable development should be defined, a consensus has emerged that there must be progress on three fronts -- economic development, social development, and preservation of the environment -- to move towards a sustainable state, and that strong linkages exist between these dimensions.

Similarly, most definitions of *urban sustainability* reflect the need for progress on the economic, social and environmental conditions in urban areas. Urban sustainability also implies an orientation towards the future, reflecting the importance of inter-generational equity. Richardson (1989) defines sustainable urban development as:

"...a process of change in the built environment which fosters economic development while conserving resources and promoting the health of the individual, the community and the ecosystem (recognizing that...the urban environment cannot be separated from the region of which it is a part)."

### *Measuring Urban Sustainability*

Through the development and use of *indicators*, a city's progress towards achieving sustainability -- a healthy natural environment, strong economy, and social well-being -- can be examined. Like sustainability, indicators have been defined in many different ways and from many different perspectives. A definition adapted from the Organization for Economic Cooperation and Development (OECD, 1994) reads as follows:

"... a statistic or parameter that, tracked over time, provides information on trends in the condition of a phenomenon and has significance extending beyond that associated with the properties of the statistics itself."

#### **Sample of Indicator Definitions**

"...[Indicators] are a way of seeing the 'big picture' by looking at a smaller piece of it. They tell us which direction we are going: up or down, forward or backward, getting better or worse or staying the same." - Jacksonville Community Council (1992)

"An indicator is a statistic or measure which facilitates interpretation and judgements about the condition of an element of the world or society in relation to a standard or goal." - modified from U.S. EPA (1972)

While the definitions vary, there is a consensus that an indicator should be more than just a simple statistic or measurement. Unlike simple statistics, indicators provide a summary indication of a condition or problem, and permit the observation of progress or change. This progress can be measured over time or against benchmarks, targets or visions for the future.

"*Sustainability indicators* can be defined as indicators that link the social, environmental and economic elements of the ecosystem, have an overlying equity component, and are directly related to society's goals for future sustainability" (Kerr, workshop presentation). Indicators of urban sustainability can be used to measure and monitor the environmental, social and economic conditions in urban communities. In turn, the information arising from indicator development and application can be an effective input to urban decision making, as well as policy and program development and evaluation. Other potential uses for urban sustainability indicators include:

- compliance with policy or legislation;
- improved efficiency/effectiveness of municipal services and functioning of cities;
- public information and improved citizenship;
- identification of distressed urban areas and opportunities for intervention;
- monitoring of progress towards goals, standards and targets; and
- locational decisions by firms or individuals.

There are many potential users of urban sustainability indicators, including: municipal urban planners and government officials; elected officials at all levels of government; senior bureaucrats and decision makers; citizen groups, non-government organizations, and interest/lobby groups; media; educators; private industry; and the general public. The needs and expertise of potential indicator users are important considerations in the choice, development and presentation of appropriate indicators.

#### *Progress on Urban Sustainability Indicator Development*

Although the urban sustainability indicator field is an emerging one, a number of initiatives are under way to develop and apply indicators, both internationally and in Canada. Of note at the international level is the United Nations Centre for Human Settlements' Indicators Programme, which has resulted in the development of a set of key urban indicators that can be used to assess conditions in human settlements throughout the world (see UNCHS, 1995 and Section 6 of these proceedings).

In Canada, indicator development exercises have been initiated at the national, provincial and municipal levels. These initiatives range from programs to develop and apply national indicators and report on Canadian progress towards sustainability, to regional and municipal initiatives designed to measure and characterize sustainability in local urban areas. Table 1 presents a sample of current Canadian indicator development initiatives (see also Section 3 of these proceedings).

#### *Collaborative Approach to Canadian Indicator Development*

As interest in measuring urban sustainability in Canada and abroad has risen, so too have the number of indicator development initiatives and studies. Recognizing the opportunity to facilitate coordination and information sharing among urban indicator practitioners and to build on the substantial base of Canadian indicator experience, Canada Mortgage and Housing Corporation (CMHC) and Environment Canada formed a partnership in January, 1995. Both organizations

have a strong interest in developing and applying meaningful and useful indicators of urban sustainability in Canada, and in contributing to international indicator initiatives. Another interest of the CMHC/Environment Canada partnership is to facilitate and coordinate national reporting on progress towards urban sustainability, both in Canada and internationally -- to the Habitat II Conference in Istanbul in 1996 and to the United Nations Commission on Sustainable Development.

**Table 1:**  
**Sample of Canadian Indicator Development Initiatives**

<p><b>National:</b></p> <ul style="list-style-type: none"><li>• Environment Canada - National Environmental Indicators Program</li><li>• Canada Mortgage and Housing Corporation - Quality of Life Indicator Framework and Applications</li></ul> <p><b>Provincial:</b></p> <ul style="list-style-type: none"><li>• British Columbia Round Table - Urban Sustainability Indicators Report</li></ul> <p><b>Municipal:</b></p> <ul style="list-style-type: none"><li>• Hamilton-Wentworth - Sustainable Community Indicators Project</li><li>• Greater Toronto Area Coordinating Committee - Quality of Life Indicator Initiative</li><li>• Metropolitan Toronto - State of the Environment Report which highlights indicators</li></ul>
--

## **1.2 Canadian Indicators Workshop**

In keeping with their collaborative approach, CMHC and Environment Canada co-hosted *Measuring Urban Sustainability: Canadian Indicators Workshop* from June 19 to 21, 1995 in Toronto, Ontario. This national workshop brought together a diverse mix of 75 urban indicator experts and practitioners from a cross-section of Canadian regions and from several international agencies. While workshop participants were drawn from different sectors -- municipal, provincial and federal government; non-government and community organizations; researchers and consultants; and academia -- all shared a common interest in furthering the development of urban sustainability indicators in Canada and internationally. The backgrounds and perspectives of

workshop participants were also reflective of the three interrelated components of urban sustainability: environmental, social and economic.

The workshop program is included as Appendix A. A complete list of workshop participants, chairpersons and rapporteurs is found in Appendix B.

### *Purpose, Objectives and Challenge to Participants*

The purpose of the workshop was to bring together experts from across Canada to exchange information, discuss the successes and pitfalls of current indicator frameworks and approaches, and chart a course for future work on urban sustainability indicators in Canada.

The workshop objectives were to:

- 1) advance conceptual development and application of urban sustainability indicators and frameworks in Canada at the local and national levels;
- 2) develop guidelines and criteria, and provide practical examples for the selection, interpretation and application/use of urban sustainability indicators in Canada;
- 3) exchange information and findings on indicators among municipalities and other government levels and agencies in Canada; and
- 4) develop a national overview paper and synthesis/proceedings report that focus on the contribution that Canada can make to the development and application of urban sustainability indicators at the North American and international levels.

*"I give you three challenges: choose it, use it and export it."*

(Challenges to participants from Workshop Co-Chairperson Robert Slater, Assistant Deputy Minister, Environmental Conservation Service, Environment Canada)

Workshop Co-Chairperson Robert Slater set the stage for the meeting by challenging participants to address the following key questions:

- *Choosing* indicators - Can we identify and choose a set of core urban sustainability indicators which will effectively characterize progress towards sustainability in urban areas?
- *Using* indicators - How can we use indicators in setting priorities and allocating resources?
- *Exporting* Canadian knowledge - How can Canada contribute in North America and internationally to measuring progress on urban sustainability using indicators.

***Key Background Materials and Issues***

To assist participants in preparing for meeting, CMHC, Environment Canada and the Intergovernmental Committee on Urban and Regional Research (ICURR) commissioned and circulated a report entitled *Developing Indicators of Urban Sustainability: A Focus on the Canadian Experience* (Maclaren, 1995) prior to the workshop. This report was presented as the keynote address at the workshop. It is referred to throughout this proceedings document, and is available from ICURR as part of its Publications Series.

In addition, participants were provided with a concise issues paper, entitled *Issues in Developing Indicators of Urban Sustainability* which was prepared by Virginia Maclaren. Table 2 presents the eight key issues which were outlined in the issues paper. These issues, along with more specific focus questions developed by the workshop organizers, provided a framework for discussions at the workshop. A copy of the issues paper is included in Appendix C.

***Workshop Program***

The workshop featured a mix of presentations by urban sustainability indicator experts and practitioners, plenary discussion sessions, and small group discussions. The presentations focused on urban sustainability indicator programs at the national, provincial and municipal level in Canada, as well as the international UNCHS Indicators Programme, and were designed to set the stage for discussion of important issues relating to indicator development (see Table 2) in the small group sessions. Small group chairpersons utilized a series of focus questions to help initiate and guide discussion, and rapporteurs presented the results of the groups' deliberations at reporting plenaries. Small group chairpersons and rapporteurs were volunteers from among the workshop participants.

On three occasions during the workshop, the lead rapporteur prepared an interim progress report summarizing the highlights and key results of the small group sessions. These reports were intended to provide a snapshot of progress made, and enabled participants to build on the results in subsequent small group and plenary sessions. The content of the rapporteur's reports has been incorporated in these proceedings.

**Table 2:**  
**Key Issues in Developing Indicators of Urban Sustainability**

1. Is there a common definition of urban sustainability that should be used when developing indicators of urban sustainability?
2. Which indicator framework offers the most promise for developing urban sustainability indicators?
3. Which indicator selection criteria should be used when identifying urban sustainability indicators? Are some selection criteria more important than others? If so, which ones are more important and how would their relative importance be determined?
4. Is it desirable to have a "core" set of urban sustainability indicators that can be used by all municipalities in Canada? If so, how many indicators should be included in this core set and how should they be selected?
5. Who should be involved in identifying and choosing urban sustainability indicators? How does the choice of indicators vary with the target audience and with the proposed application?
6. How can "forward-looking" indicators be constructed?
7. Should attempts be made to develop composite indicators or indexes of sustainability?
8. What are some of the best examples of good urban sustainability indicators?

### ***Workshop Proceedings***

This proceedings report provides a summary and synthesis of the workshop presentations and plenary and small group discussions. The report also identifies the key themes, issues, observations and conclusions raised during the meeting. It is intended to serve as a summary report for distribution to workshop participants, as well as practitioners and decision-makers involved in measuring progress towards urban sustainability. As these proceedings will be made available to a broader audience, relevant background information relating to urban sustainability indicator development -- including key definitions and terminology -- has been included



throughout the report. In addition, a list of selected readings on the topic of indicator development is included in Appendix D for those wanting more information.

Following this Introduction, Section 2 provides an "at-a-glance" summary of the workshop results -- key observations, recommendations and conclusions. Section 3 presents an overview of the Canadian experience in indicator development. Sections 4-6 summarize participants' input on important aspects of measuring urban sustainability, as provided during the presentations and plenary and small group discussions: the definition and characteristics of urban sustainability; development of urban sustainability indicators; and Canada's role in international indicator initiatives. Finally, Section 7 provides a synopsis of conclusions presented by the workshop Co-Chairperson, Douglas Stewart, and participants' views on the next steps which should be taken to further the development of urban sustainability indicators in Canada.

## 2. Workshop Highlights: Key Observations, Recommendations and Conclusions

### *Key Issues Relating to Indicator Development*

- It is very important to develop a **vision and specific objectives for a sustainable urban future**, whether it be at the national, regional or local level. Without this context, it is impossible to identify a set of credible, relevant indicators.
- **Communications** is a key element in developing urban sustainability indicators. There is a clear need to identify the target audience, to understand their needs and perspectives, and the context in which they will use the indicators.
- There is a concern among indicator practitioners about the **quality and availability of data** needed to support indicator development.
- It is important to identify "**actionable**" indicators that can be implemented in a **cost effective** way.
- There is a need to recognize and work within the constraints imposed by the limited resources available for indicator development, particularly in smaller communities. In view of scarce resources, there is a **tremendous opportunity to work collectively to identify common indicators** and pool resources and efforts aimed at collecting and interpreting data to support these indicators.

### *Indicator Frameworks*

- There was general agreement among workshop participants that the most appropriate framework for indicator development may consist of the best elements of each of the three existing frameworks -- theme-based, condition-stress-response, and Community Oriented Model of the Lived Environment (COMLE) -- or could be derived by modifying one or more of the frameworks. The composition of the "hybrid" framework (perhaps an enhanced combination of the condition-stress-response and COMLE frameworks) would depend on the desired vision and objectives for urban sustainability, and the intended audience and indicator users.

### ***Indicator Selection Criteria***

- Based on the workshop discussions, the most "significant" selection criteria include: scientifically valid, theoretically sound; responsive; relevant to stated goals; cost effective to collect and use; unambiguous indicators; and integrative of environmental, social and economic factors.
- Generally, participants agreed that the criteria presented at the workshop were appropriate for indicator selection. However, several additional selection criteria were suggested, including: a criterion addressing public participation in developing the selection criteria; a criterion which characterizes the ability of indicators to trigger action, or their potential importance for policy development; an equity criterion to take account of the distribution of equity; a criterion to address an indicator's ability to be measured and monitored; and a criterion to assess whether an indicator is comparable over time.

### ***Core or Common Set of Indicators***

- There was general support among participants for the development and use of a single set of national common urban sustainability indicators. Municipalities would use the common set as a template which could be adjusted based on local needs, circumstances, goals, objectives, and community input.
- A common set of national indicators should include a mix of different indicator types (forward looking, retrospective, objective and subjective). A combination of indicator types is needed in order to best characterize the complex, multi-dimensional concept of urban sustainability.
- Participants identified potential core or common urban sustainability indicators in four broad areas: 1) social/culture/institutional; 2) environment; 3) economy; and 4) infrastructure/influencing factors. Key indicator categories identified include: equity/income distribution/poverty; education; public safety/crime; air quality; water quality and use; ecosystems/green space/biota; land use/urbanization; energy and resource consumption; economics; and transportation.

### ***Next Steps Recommended by Workshop Participants***

1. Identify a national organization(s) to take the lead role in developing urban sustainability indicators, and promote opportunities for networking and information exchange among all levels of government, non-government and community organizations, and the private sector.

2. Establish an **ongoing process for indicator development** which involves stakeholders at all levels.
3. Develop a **menu of common indicators and use guidelines** to provide a template for use by municipalities, as well as provincial and national agencies.
4. Prepare a **resource and how-to guide for municipalities** to facilitate the initiation and maintenance of local indicator development and use.
5. Create an **information sharing network**, possibly on the Internet, to promote dialogue and networking about urban sustainability.



### 3. A Base on Which to Build

In the past few years, there has been considerable interest in Canada in the concept of urban sustainability, and how the sustainability of urban areas can be measured. This has led to comprehensive urban sustainability research and modelling efforts, and to the initiation of numerous programs and projects to develop and apply urban sustainability indicators throughout Canada -- at the national, regional and municipal levels. The *Canadian Indicators Workshop* was designed to build on this wealth of Canadian experience.

#### 3.1 Canadian Experience in Indicator Development

##### *National Overview of Canadian Urban Sustainability Indicators Experience: Issues and Questions*

**Presenter:** *Virginia Maclaren,*  
*Associate Professor, Department of Geography*  
*University of Toronto*

**Discussant:** *Susan Holtz,*  
*National Round Table on the Environment and Economy*

The review, based largely on the Canadian experience, revealed a range of case studies and experience in the development of indicator frameworks, selection criteria, and core indicators (Maclaren, 1995). The research suggested that there are both theoretical and methodological questions that need to be resolved, including the extent to which indicator selection should focus on simple concepts such as "what makes a community a nice place to live in?", vis à vis concerns with theoretical soundness and scientific rigour. In response, the discussant suggested that the critical issues in indicator selection and development are: What is being measured? Who needs the information? and, What is it to be used for?

##### *National Environmental Indicators Program*

**Presenter:** *Anne Kerr,*  
*Director, Indicators Branch, State of the Environment Directorate*  
*Environment Canada*

Canada's National Environmental Indicators Program is being led by the State of the Environment Directorate of Environment Canada. The objective of the program is to develop a national set of scientifically credible, understandable indicators, which are relevant to decision makers and the

public, representative of the state of Canada's environment, and indicate trends towards sustainable development. Indicators are being developed in consultation with government and non-government organizations.

The program focuses on developing indicators of sustainability from an environmental perspective. To date, urban indicators for municipal water use, wastewater treatment, urban air quality, urban transit and automobile use have been developed as key indicators of urban sustainability. Work is now under way to develop indicators of solid waste disposal, water quality and access to green space. It is expected that these indicators will contribute an essential environmental component to a core or common set of urban sustainability indicators.

### ***Urban Quality of Life Indicators - The Community-Oriented Model of the Lived Environment***

***Presenter: Denys Chamberland,  
Acting Manager, Centre for Future Studies in Housing and Living  
Environments  
Canada Mortgage and Housing Corporation***

Under the direction of CMHC, the Community-Oriented Model of the Lived Environment (COMLE) has been developed to help municipalities assess and monitor the quality of life in local communities. The COMLE Model provides a framework for applying 48 quality of life indicators in municipalities, and makes a direct link between quality of life and urban sustainability.

In 1993, the COMLE Model was pilot tested in three municipalities -- Toronto, Quebec City and Fort McMurray -- to ensure its utility and affordability for municipal users. The pilot test revealed that the Model is practical, adaptable, useful and affordable. The pilot test also identified areas where the Model can be improved, particularly through the inclusion of more environmental and municipal finance indicators, as well as better integrative indicators to link the social, environmental and economic spheres of the Model. CMHC is currently considering these and other enhancements to the Model.

### ***Hamilton-Wentworth - Community Indicators***

***Presenter: Mary Ellen Scanlon,  
Senior Planner  
Hamilton-Wentworth***

The Sustainable Community Indicators Project in the Regional Municipality of Hamilton-Wentworth is a key component of the Region's Sustainable Community Initiative -- Vision 2020. The Vision 2020 initiative provides a new framework for decision making in Hamilton-Wentworth, based on the principles of sustainable development.

The purpose of the project is to identify a set of about 30 community indicators that can be used to monitor progress towards achieving the goals of Vision 2020. These indicators are being developed through an extensive community consultation program. Residents and community groups have been involved in establishing priorities for indicator selection, as well as in identifying appropriate indicators and accompanying targets. Primary mechanisms for community involvement have included meetings, discussion groups and an interactive workbook. This workbook served two main purposes: it provided recipients with information about the project and facilitated input through the completion of worksheets. Regional staff are currently developing a short list of indicators based on the input received, and are planning further consultations once this list has been developed.

### ***Greater Toronto Area - Quality of Life Indicators***

***Presenter: John Gladki,  
Director, Program, Policy and Research  
City of Toronto***

Under the direction of the Greater Toronto Area Coordinating Committee, indicators are being developed to characterize the quality of life in the Greater Toronto Area (GTA). This indicator initiative is designed to study the impacts of urbanization in the GTA, and provide a basis for more coordinated policy making among the eight participating municipalities. Program proponents are also interested in using indicators to assess economic development opportunities and competitiveness in the GTA.

The GTA initiative is using an adapted version of the COMLE Model. Indicators have been developed for a number of broad categories, including: housing, transportation/urban structure, natural environment, employment and commerce, health, education, recreation/leisure, public safety, and social welfare. In addition, a public opinion survey is being conducted to consider GTA residents' attitudes towards the quality of life in their communities. The survey results will be combined with the indicator analysis to provide an overall assessment of the quality of life in the GTA. In addition to complementing COMLE's objective indicators, the public opinion survey provides a comprehensive methodology to collect subjective indicators.

### ***Metropolitan Toronto - State of the Environment Indicators***

***Presenter: John Barr,  
Director, Research and Special Studies Division, Planning Department  
Metropolitan Toronto***

Metropolitan Toronto's State of the Environment report (1995) describes conditions and trends in Metropolitan Toronto's environment. The purpose of the report is to provide Metro Council and the public with information to assess changing environmental conditions resulting from the impact



of human activity. The report uses a wide range of environmental data to provide representative indicators of the state of land, air and water resources. Metro's indicators focus on the physical and biophysical environment, and were developed in consultation with environmental and community groups.

Metro's State of the Environment report uses a condition-stress-response model to characterize the impacts of human activity on the environment, as well as the actions which are being taken to address environmental issues. This framework was chosen to help Metro determine how their environmental management actions are enabling their environmental goals and objectives to be met.

### ***British Columbia Round Table - Urban Sustainability Indicators Report***

***Presenter: David Harper,  
President  
Westland Resource Group***

The British Columbia's Round Table's State of Urban Sustainability Indicators Report (1994) examines urban sustainability at the provincial level in British Columbia. The report focuses on five municipalities -- Greater Vancouver Regional District, Greater Victoria, Prince George, Kelowna, and Cranbrook -- to characterize urban sustainability in the province. A key objective of the Round Table's indicator development initiative is to provide useful information for planning and policy decision makers.

The report includes over 80 urban sustainability indicators in five broad categories: human settlements and population growth; the urban environment; the urban economy; social well-being; and governance and responsible citizenship. Data availability was a key consideration in identifying and selecting appropriate indicators. The results of the indicator analysis are summarized in a report card format, which provides an assessment of urban sustainability conditions and trends.

### ***Abbotsford, (Matsqui) British Columbia - Environmental Policy Study***

***Presenter: Peter Andzans,  
Environmental Manager  
City of Abbotsford***

Abbotsford's environmental study focuses on the condition of the natural environment, as well as identifying actions to address environmental problems in the community. In consultation with the community, indicators were developed for air quality, water quality management, noise, solid waste, urban microclimate, wildlife, vegetation, and soil resources.

Abbotsford's experience with indicator development highlights the challenges facing smaller communities with limited resources. The community is currently considering whether to update the initial indicator development process, which was undertaken in 1990. A key consideration for Abbotsford is whether to spend scarce resources on further indicator development and monitoring, or on specific actions to address environmental problems and achieve the community's sustainability goals.

### 3.2 Learning From What's Been Done Already

Workshop participants and presenters included some of the most experienced urban sustainability indicator practitioners in Canada, as well as several international experts. This provided an excellent basis for the exchange of information about many of the key issues and challenges involved in initiating and implementing an urban sustainability indicator development process or program. This section provides a summary of the most important lessons learned from practical experience with urban indicator development in Canada.

**A well-defined and widely accepted process** is one of the most important factors in initiating and sustaining a successful indicator development initiative, whether at the municipal, provincial, national or international level.

Establishing a **clear vision, goals and objectives for urban sustainability** is essential to provide the foundation and context for indicator development. This was found to be particularly important in British Columbia's sustainability initiatives, CMHC's COMLE project and particularly in Hamilton-Wentworth's Vision 2020 process and Community Indicators Initiative, as was community participation in developing the vision, goals and objectives. The indicators which are then developed must be closely tied to the vision, goals and objectives.

For certain level/ type of indicators, **local participation** is vital in fostering community support, commitment and visibility for indicator development initiatives. Community consultation was a key element of municipal indicator initiatives in Hamilton-Wentworth, Metropolitan Toronto, and British Columbia. Proponents of Hamilton-Wentworth's initiative discovered that indicator development is a complex topic on which to obtain community input, but also found that community participation was very helpful in identifying significant areas of concern (eg. crime and safety) in the community.

Community stakeholders must be **empowered** to participate, and **educated** to ensure that they can participate effectively. Hamilton-Wentworth's indicators initiative included a public education component as it was recognized that some concepts relating to urban sustainability were not well understood in the community.

A **practical resource/how-to guide or workbook** can be an effective tool for facilitating community involvement in developing urban sustainability indicators, and for generating awareness and public understanding about sustainability and indicator development. Hamilton-Wentworth used a workbook in their indicator initiative, and found it to be an effective mechanism.

A set of **adaptable core or common indicators** would be useful as a template to help municipalities initiate indicator development and use. Communities could supplement or adapt the list of indicators based on local needs, objectives and community input. The core or common indicators could also be used to facilitate reporting on urban sustainability at the national and international level.

**Target-setting** is important to help operationalize the vision, goals and objectives for urban sustainability. In many cases, scientifically based targets, objectives, standards and benchmarks are available (eg. air and water quality objectives developed by Environment Canada and the provinces). Additional targets or benchmarks could be developed through community consultation. Targets should be flexible in some cases.

In some instances, a **lack of relevant data** has caused difficulties for those implementing indicator development programs. Proponents of indicator initiatives in Environment Canada, CMHC, Metropolitan Toronto, the Greater Toronto Area, Hamilton-Wentworth, Abbotsford and the British Columbia Round Table all noted problems or gaps in data, and reported that their initiatives focused on selecting indicators for which there is existing data and information sources. The development of common indicators, backed by **consistent, organized and permanent data bases** could provide an effective solution to this problem. The data bases could be managed by a national organization, and would provide a useful resource to communities involved in indicator development. The data must be operational on a computer network to maximize its utility for analytical and reporting purposes.

Urban sustainability indicators can be particularly useful at the local level to assist in decision making. To be most effective for local decision making and policy development, indicators must be **scientifically valid, multi-sectoral, practical and cost effective**. Indicators can also play an important educational role in helping individuals and communities to think globally, as well as locally.

**Smaller communities** face particular challenges in undertaking indicator development. The City of Abbotsford faces a dilemma of allocating scarce resources to resume its indicator development initiative or towards more concrete actions to improve environmental conditions.

#### 4. Defining Urban Sustainability

As noted in Section 1, there are many different definitions of urban sustainability and related concepts. The background paper (Maclaren, 1995) distributed to workshop participants provided several definitions of urban sustainability as well as individual definitions for social, environmental and economic sustainability.

The workshop was not intended to debate or reach a consensus on an exact definition for urban sustainability. Participants were asked to accept as a starting point that the essence of urban sustainability is: 1) a multi-sectoral approach involving the integration of environmental, social and economic components; and 2) a futures orientation reflecting inter-generational equity. The workshop discussions revealed a strong consensus among participants that environmental integrity, social well-being and economic viability *are* the three key components of urban sustainability. Each of the three components must be included in any definition of urban sustainability, and the linkages and interrelatedness between the components recognized. Table 3 provides a further description of each component, as envisioned by the Metropolitan Toronto Planning Department.

**Table 3:**  
**Components of the Liveable Metropolis**

**Environmental Integrity:** clean air, soil and water, and a variety of species and habitats maintained through practices that ensure sustainability over the long term.

**Economic Vitality:** a broadly based, competitive economy responsive to changing circumstances and able to attract new investments so that opportunities for employment and investment will be available in both the short and long term.

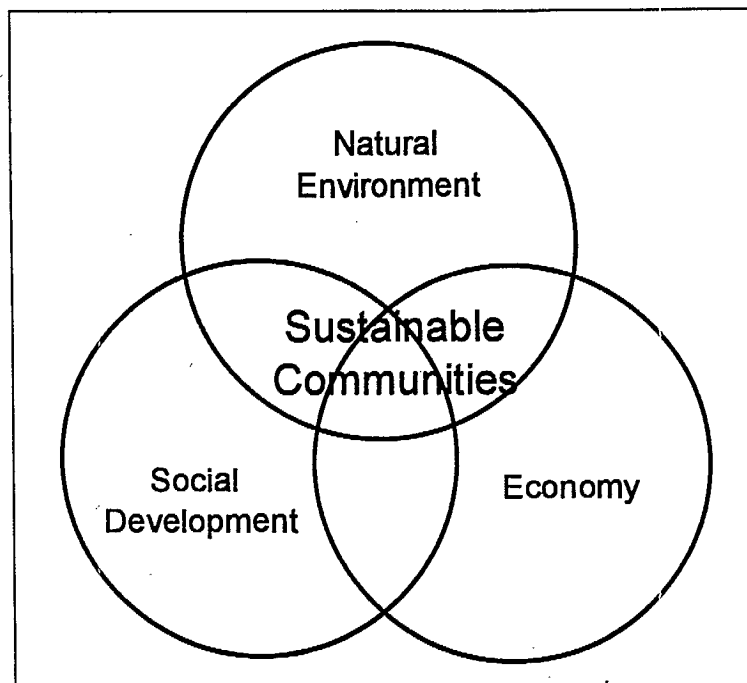
**Social Well-Being:** safety and health as well as equitable access to housing, regional, community and neighbourhood services and recreational and cultural activities.

*Source: Metropolitan Toronto Planning Department (1991)*

There was less agreement among participants as to the relative importance of each component of urban sustainability. Some participants called for a balanced integration of environmental, economic and social considerations. For example, Canada Mortgage and Housing Corporation's

(1991) diagram for a sustainable community (Figure 1) gives equal consideration to each component. Others suggested that the environmental/biophysical component should be prevalent, followed in importance by the social and economic components respectively.

**Figure 1:**  
**A Systems Perspective on Sustainable Communities**



source: modified from D'Amour (1991)

The workshop discussions also illustrated that the concept of urban sustainability means different things to different people. To some participants, urban sustainability implies a process which leads to more sustainable urban areas, rather than a desired end point or goal. To others, it invokes a vision of individual and community well-being, economic stability, and a clean, healthy environment. For others still, sustainability is simply an ethic.

Some participants thought that a common national definition of urban sustainability is needed to provide a solid foundation for the development and application of urban sustainability indicators. With this view, there must be a widely understood and accepted definition of what is to be measured, prior to indicator development. Defining urban sustainability could encompass

development of a vision of what would constitute a sustainable urban area, as well as core principles, values, goals and objectives. This would provide a long-term (inter-generational) focus to guide indicator development and use, as well as a basis for addressing more immediate issues and problems affecting urban areas.

Other participants noted that because urban sustainability means different things to different people, it would be very difficult to agree on and use a common definition. With this view, it is most useful to identify key characteristics of urban sustainability.

#### **Focus Questions for Discussion Group Participants:**

What are the key characteristics of urban sustainability? What are the most important issues involved in achieving sustainability in urban areas?

### **4.1 Key Characteristics of Urban Sustainability**

In the small group sessions, workshop participants were asked to discuss the key characteristics of urban sustainability. To help initiate discussion, workshop organizers provided participants with a diagram entitled "Characteristics of Sustainability" (see Figure 2).

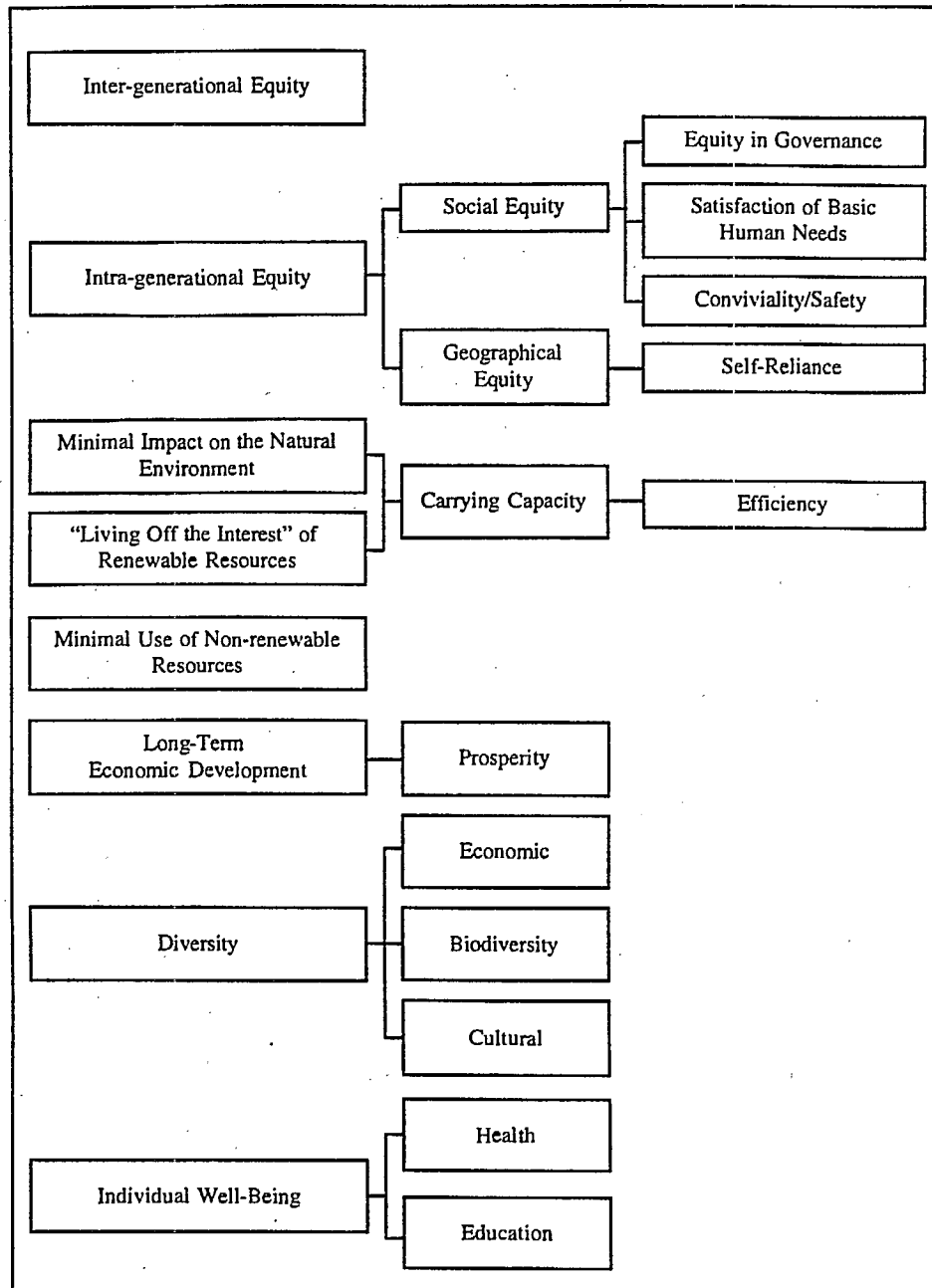
The key characteristics of urban sustainability, as identified by participants, have been categorized under four broad headings:

#### **I. Environmental Component**

Urban sustainability...

- ...implies dynamic, changing processes (rather than a steady state);
- ...encompasses sufficiency, sustainability of life processes and ecosystem integrity;
- ...invokes the concept of carrying capacity/appropriated carrying capacity (must stay within the limits of the ecosystem).

**Figure 2:  
Characteristics of Sustainability**



Source: Maclaren (1995)

## II. Social Component

Urban sustainability...

- ...connotes social stability and encompasses equity (social, intra- and inter-generational);
- ...includes individual and community well-being and quality of life and reflects human values;
- ...implies vitality and a social learning process (feedback on choices and actions);
- ...infers self-reliance, promotes community empowerment and involvement, and means individual responsibility (people must make sustainability part of their attitudes and lifestyles).

## III. Economic Component

Urban sustainability...

- ...must reflect economic realities and consumer demand (need to balance with carrying capacity of ecosystems);
- ...promotes long term economic development that does not unduly draw down the stock of environmental resources (through diversification and increased resource use efficiency);
- ...provides for a fair distribution of costs and benefits of resource use and environmental protection.

## IV. Integrative/Interrelating Characteristics

Urban sustainability...

- ...means more than just survival and implies a hierarchy of needs;
- ...is adaptable to change and can be measured to determine rate of change;
- ...involves trade-offs and infers that there are limits which we must live within;
- ...has implications at all levels -- household, community, regional, national, international/global; the linkages between levels are important;



- ...needs to be related to organizational and institutional frameworks (including governance).

## 4.2 Important Issues in Achieving Urban Sustainability

Participants were also asked to consider what in their view are the most important issues involved in achieving sustainability in urban areas. This discussion built on the array of issues discussed in Maclaren's (1995) report for this workshop and the issues list which is provided in Appendix C. During the small group discussions on this question, several important issues were identified and discussed, and are summarized below.

**When measuring urban sustainability, at what scale should the "urban" boundary be defined: city/municipal, metropolitan region, watershed, bioregion, ecodistrict, global?** The link between local and global sustainability was stressed. The "ecological footprint"<sup>1</sup> metaphor reminds us that major urban areas draw upon resources from the entire world.

**To move toward urban sustainability, what approach is most appropriate: ecosystem approach, systems approach, or some other?** One small group suggested that an ecosystem approach would be the best for linking the environment and socio-economic components of urban sustainability, and that taking a systems perspective (defined more narrowly) may result in sustainability at one level in a nested set of systems, but perhaps at the expense of other system levels. Another group concluded that an ecosystems approach would be best because this approach focuses on linkages and relationships between components, and recognizes the need to maintain self-regulatory processes.

**Population growth and the management of urbanization** is a key issue relating to the achievement of sustainability in urban areas.

**The need to "dematerialize" the urban economy** is an important issue in achieving urban sustainability. This would involve the use of much less energy, resources and materials, as well as improved efficiencies. A dematerialized economy would also be characterized by less consumptive lifestyles, and more focus on services, education and the information exchange through less wasteful methods like the information "highway".

---

<sup>1</sup> Ecological Footprint - the resources (especially the land-base) required to sustain or carry a specified activity or group of activities based on ecological assessment of the activity, Rees and Wackernagel (1994).

## 5. Developing Urban Sustainability Indicators

### 5.1 Indicator Frameworks

An important initial step in identifying urban sustainability indicators is to select a framework for indicator development. A framework is a conceptual model from which relevant indicators can be developed and selected based on the needs of a specific target audience. Maclaren (1995) identifies three types of frameworks that are commonly used to develop urban sustainability indicators, as well as several other types of indicators -- environmental, quality of life and healthy city indicators. The first is the *theme-based framework* in which indicators are developed for each sustainability "theme" or principle.

The second, the *condition-stress-response (or condition-stress-societal response) framework*, originates from state of the environment reporting. The underlying concept for this framework is that human activities affect environmental conditions, which in turn affect economic, health and social conditions. Society may respond with preventative or regulatory measures to reduce the stress of human activities on environmental conditions.

The third framework is known as the *Community Oriented Model of the Lived Environment (COMLE)*. This framework begins by identifying areas of municipal government responsibility, such as housing and transportation. It then links these areas of responsibility to three theme areas: environmental integrity, economic vitality and social well-being.

#### Focus Questions for Discussion Group Participants:

What makes for a good framework? What are the advantages and disadvantages of adopting specific frameworks? What are the key components of a framework within which to measure urban sustainability?

The workshop discussions focused on the elements of a good indicator framework, and on the potential utility of three above-mentioned frameworks for developing urban sustainability indicators. For the most part, workshop participants did not advocate the use of any one of the three alternative frameworks. Rather, there was general agreement that the most appropriate

framework for indicator development may consist of the best elements of each of the existing frameworks, or could be derived by modifying one or more of the frameworks.

The composition of the "hybrid" framework -- perhaps an enhanced combination of the condition-stress-response and COMLE frameworks -- would depend on:

- the desired vision for urban sustainability;
- the purpose of urban sustainability indicator development;
- the clients (users) of the framework and accompanying indicators; and
- the range of audiences which will receive and/or use the information resulting from indicator development and application.

There was a strong message from participants that in a given jurisdiction or situation, the vision, purpose, clients, and audiences must be identified before an appropriate framework can be selected or modified. The most likely clients for indicator frameworks would be municipal decision makers and managers responsible for policy development and evaluation. Audiences could include: lay audiences; technical audiences; municipal decision makers and managers; and international/global audiences.

### *Elements of a Good Urban Sustainability Indicator Framework*

Participants identified the following desirable attributes of an urban sustainability indicator framework:

- linked to vision of urban sustainability;
- recognizes and integrates the components of urban sustainability; focuses on linkages and interrelationships; takes a systems approach; reflects causality;
- workable and practical; flexible for users (in different jurisdictions); iterative, provides possibility for adjustments ("looping back"); not limited by jurisdictional mandates and boundaries;
- results in usable information; simple, understandable, educational;
- empowering, motivational for individuals and communities; inclusive of key stakeholders; promotes partnerships between governments, and between the public and private sectors;

- compatible with other issues and frameworks; provides a foundation for action on problems/issues facing urban areas; and
- amenable to both quantitative and qualitative data.

### *Comments on Specific Indicator Frameworks*

Participants also offered specific guidance on the three potential indicator frameworks introduced at the workshop. A theme-based framework may be most appropriate for tracking government policies and for ease of understanding by the public. The environmental stress-response framework is particularly useful for identifying and addressing issues of cumulative effects of human activities on ecosystems. A quality-of-life framework can be effective in attracting public attention, especially if there is a discrepancy between "objective" and "subjective" indicators, but can raise political sensitivities if perceived to be governmental ratings or promotion.

## **5.2 Indicator Selection Criteria**

Table 4 (Maclaren, 1995) identifies a list of criteria that are commonly used in selecting indicators, and which could be used for choosing appropriate indicators of urban sustainability.

### **Focus Questions for Discussion Group Participants:**

What are the most significant criteria to employ in the selection and development of urban sustainability indicators? Do these criteria differ from those used to select other types of indicators?

In reviewing these potential selection criteria, participants generally agreed that the criteria presented were appropriate for selecting urban sustainability indicators. A number of participants noted a "tension" between two selection criteria in particular: scientific validity/theoretical soundness and understandability by potential users. One suggestion was to use different indicators for different audiences and purposes.

This was also considerable discussion about at what level trade-offs between selection criteria should be made. Some participants suggested that trade-offs are best made at the local (municipal) level by those who will use and apply urban sustainability indicators. With this view, the best approach may be to provide municipalities with a slate of selection criteria which can be adapted based on local needs and priorities.

**Table 4:**  
**Potential Indicator Selection Criteria**

- 1) *Scientific validity/theoretical soundness* - is the indicator valid from a scientific perspective?
- 2) *Representativeness* - does the indicator effectively represent or characterize the issue of concern or a broad range of environmental conditions?
- 3) *Responsiveness* - can the indicator distinguish between the normal situation or cycle and movement away from or towards a sustainable state?
- 4) *Relevance to stated goals* - is the indicator relevant to the vision of sustainability, to the geographical area being considered, and to the needs of potential users?
- 5) *Accuracy* - is the indicator based on accurate data?
- 6) *Accessibility and availability of data* - does the data relevant to the indicator exist and can it be obtained?
- 7) *Understandable by potential users* - does the indicator have meaning or significance for the intended users?
- 8) *Able to provide early warnings of potential change* - is the indicator able to predict or provide an "early warning" of possible futures?
- 9) *Comparable to thresholds or targets* - can the indicator measure progress towards targets for sustainability?
- 10) *Comparable with indicators developed in other jurisdictions* - does the indicator enable comparison with other municipalities or urban areas?
- 11) *Cost effective to collect and use* - what are the cost implications of using the indicator?
- 12) *Unambiguous* - can the indicator be interpreted in more than one way?
- 13) *Attractive to media* - will the media communicate the indicator to the general public?
- 14) *Integrative of environmental, social and economic factors* - how well does the indicator capture linkages between the three components of urban sustainability?
- 15) *Able to take account of social, environmental, and economic distribution of conditions within a population or across a geographic region* - does the indicator effectively capture distributive effects?
- 16) *Focus on linkages between indicators and answer the question: "If a given indicator achieves or is set at a certain level, what will the level of an associated indicator be in the future"* - is the indicator forward-looking and relevant for the sustainability principle of inter-generational equity?
- 17) *Able to distinguish between local and non-local sources and impacts* - can the indicator identify sources of polluting affecting an urban area, but outside of its control (eg. originating from outside the jurisdiction)?

Source: Maclaren (1995)

Table 5 provides a summary of participants' input on the criteria and their relevant significance. These ratings provide some indication of the views expressed at the workshop. As such, these ratings are not intended as an in-depth analysis or discussion. From Table 5, it is possible to extract a preliminary categorization illustrating participants' general views on the relative significance of the various selection criteria:

High Significance

Scientific validity/theoretical soundness  
Responsiveness  
indicators  
Relevance to stated goals  
Cost effective to collect and use  
Unambiguous  
Integrative of environmental, social and economic factors

High-Medium Significance

Representativeness  
Accuracy  
Accessibility and availability of data  
Understandable by users

***Other Potential Selection Criteria***

In addition to reviewing the criteria presented in the Maclaren paper (1995), participants suggested a number of new potential indicator selection criteria. Some felt that there should be a criterion addressing public participation in developing the selection criteria. This was thought to be important because public involvement would help facilitate stakeholder buy-in in monitoring and taking action on the results of monitoring. Participation in developing the criteria would also provide an opportunity to educate stakeholders about sustainability, and ensure that stakeholders' differing needs and perspectives are considered.

Some participants suggested that a criterion should be included which characterize the ability of indicators to trigger action, or their potential importance for policy development. Others recommended that an equity criterion is needed to take account of the distribution of equity, as well as provide the impetus to include "disadvantaged" people in the process. Still others felt that

Medium Significance

Comparable to thresholds and targets  
Comparable with other jurisdictions'

Medium-Low Significance

Provide early warnings

Low Significance

Attractive to media

**Table 5:  
Input on Indicator Selection Criteria**

<b>Criterion</b>	<b>Significance*</b>	<b>Additional Comments</b>
Scientific validity/theoretical soundness	High (4 of 4)	Need to include indicators that are hard to measure, as long as there is credible theory behind them. Honesty in handling data is key. Need to allow for evolution of standards, procedures, methods.
Representativeness	Medium (2 of 3) High (1 of 3)	Important to keep the number of indicators manageable.
Responsiveness	High (3 of 3)	Need to indicate system changes in a timely way. Indicators need to be responsive in a time frame that allows enough time to take effective action.
Relevance to stated goals	High (3 of 3)	
Accuracy	High (1 of 2) Medium (1 of 2)	Need to consider level of accuracy for each particular indicator. Key to accuracy - are the results replicable? Given problems with access to information, accuracy is "icing on the cake."
Accessibility and availability of data	High (3 of 4) Medium (1 of 4)	Must be clear link between the data and what we want to measure. Very expensive to seek out new data. However, collecting new data should be considered if good existing data is not available, even if as a result of costs, fewer indicators can be used.
Understandable by potential users	High (2 of 3) Medium-Low (1 of 3)	

Provide early warnings	Medium (1 of 2) Low (1 of 2)	Less important than other criteria.
Comparable to thresholds or targets	Medium (1 of 1)	Important but not essential.
Comparable with indicators in other jurisdictions	Medium (3 of 3)	Important for core indicators only. Useful if represents economies of scale.
Cost effective to collect and use	High (3 of 3)	
Unambiguous: general agreement that a certain direction is desirable; a clear relationship	High (2 of 2)	Very important but difficult to define.
Attractive to media	Low (2 of 2)	If other, more important criteria are met (eg. understandability), framework will be attractive to the media. Relates to communication, not to selection of indicators per se.
Integrative of environmental, social & economic factors	High (1 of 1)	This criterion should be seen as "added value", but should not exclude an indicator.
Able to take account of the distribution of social, environmental, economic conditions in a population or region	(not rated)	This criterion should be seen as "added value", but should not exclude an indicator.
Focus on linkages between indicators - impact of an indicator on another	(not rated)	This criterion should be seen as "added value", but should not exclude an indicator.
Able to distinguish between local & non-local sources and impacts	(not rated)	This criterion should be seen as "added value", but should not exclude an indicator.

\* High, Medium or Low significance, as determined by the small groups. Numbers in brackets indicate the number of groups rating the criterion high, medium or low.



a criterion should address a given indicator's ability to be measured and whether it lends itself to community monitoring. Whether an indicator is comparable over time was also felt to be important.

Several participants noted that a criterion is needed to help focus the public and decision makers alike on the key problems and issues facing urban areas. Such a criterion would be "designed to embarrass" and initiate action.

### ***Prerequisites for Indicator Selection***

As with indicator frameworks, participants again stressed the need to identify the purpose for indicator development, and the intended audiences and their needs prior to determining which indicator selection criteria will be used, and which criteria are most important. There was also general agreement that the set of indicator selection criteria should:

- be connected to and reflective of the vision, principles, goals and objectives for urban sustainability;
- recognize the linkages and interrelatedness between the components of urban sustainability;
- be flexible, iterative and changeable to meet the needs and circumstances of users; and
- provide a basis for accountability.

## **5.3 Towards a Common Set of Indicators**

One of the key areas of the discussion at the workshop was the desirability of developing a core or common<sup>2</sup> set of urban sustainability indicators, as well as potential indicators that could comprise the set. This common set could be used by municipalities across Canada and the provincial and federal governments to measure the sustainability of Canadian urban areas. A common set would also enable municipalities to compare progress towards urban sustainability with national benchmarks or with that of other municipalities, and facilitate national reporting on sustainability.

During the discussions about common indicators, participants were able to refer to a list of potential indicators developed by Maclaren (1995), reproduced as Figure 3, and indicator lists from Hamilton-Wentworth, British Columbia and Seattle.

---

<sup>2</sup> Participants agreed that a national set of indicators should be referred to as a "common" set, rather than a core set. It was noted that the term "common" better communicates the message that the set of indicators is adaptable and flexible for users.



## Urban Sustainability Indicator Evaluation Matrix: (continued)

### Sustainability Principles:

1. Inter-generational equity
2. Intra-generational equity
3. Minimal impact on the natural environment
4. Living off the interest of renewable resources
5. Minimal use of non-renewable resources
6. Long-term economic development
7. Diversity
8. Individual well-being

### General Selection Criteria:

- A. Scientifically valid
- B. Representative
- C. Responsive
- D. Relevant to needs of potential users
- E. Based on accurate, available data
- F. Understandable by potential users
- G. Provide early warnings
- H. Comparable to thresholds or targets
- I. Comparable with indicators developed in other jurisdictions
- J. Cost effective to collect and use
- K. Unambiguous
- L. Attractive to the media

C = Condition, S = Stressor, R = Response

Source: Maclaren (1995)

Participants addressed a number of issues and questions relating to common indicators, including the type of indicators should be included in a common set, potential common indicators, and whether there should be a single or multiple sets of common indicators.

**Focus Questions for Discussion Group Participants:**

Based on earlier discussions of characteristics/frameworks of urban sustainability and indicator selection criteria, select a set of core indicators of urban sustainability and provide a brief rationale for each selection (10 - 15 indicators only).

***Indicator Types***

In the small group sessions, participants prepared and discussed different types of indicators, including:

*Predictive or forward looking* - indicators that rely on forecasting techniques as a means of describing the future state and development of variables describing the environment, the economy and society. These indicators help measure progress towards inter-generational equity.

*Retrospective* - indicators that focus on the past and provide indirect information about future sustainability.

*Objective indicators* - indicators which are easily quantified and measured.

*Subjective indicators* - indicators which are more evaluative of an individual's satisfaction with a certain aspect of the built environment, natural environment, economy and the social domain.

*Input versus output data* - indicators can be grouped as input or output data. For example, both input and output data can be used to measure health care. Input data for health care could include: number of hospital beds, doctors, and hospitals. Output data for health care could include: quality of health care and infant mortality rate.

*Index or composite* - indicators that consist of a combination of several individual indicators or groups of indicators.

In general, participants suggested that a common set of national indicators should include a mix of different indicator types. A combination of indicator types is needed in order to best characterize the complex, multi-dimensional concept of urban sustainability.

Through scenario building, "forward looking" indicators can be used as predictive tools to measure progress towards a desired future state or scenario. "Retrospective" indicators can provide an indication of future urban sustainability by focusing on what has happened in the past.

A recurring theme in the small group discussions was that the common set should include some indicators which are easy to measure and some which are not. Objective, easily quantified indicators are needed to address the desire for technical and scientific validity. However, because the concept of urban sustainability encompasses individual and societal values, more subjective, qualitative indicators are also required to capture its full essence. While they can be more difficult to measure and collect information on, qualitative indicators may also be more easily understood by the general public.

Participants were more tentative about the role of index or composite indicators in a national set of indicators. On several occasions during the workshop, concern was expressed about the potential loss of accuracy and detail when information is aggregated in index form, and that indices can "hide" or "mask" important changes in the individual indicators which comprise the index. If composite indicators are developed, care must be taken to address these concerns.

### *Potential Common Indicators*

Based on earlier discussions about indicator frameworks and selection criteria, workshop participants identified potential indicators that could comprise a common set of Canadian urban sustainability indicators. The master list of indicator categories and specific indicators proposed by participants is summarized in Table 6.<sup>3</sup> Table 6 also includes indicators which were recommended by respondents to the survey distributed by workshop organizers prior to the meeting.

The master list of indicators is best characterized as a starting point for further indicator development and selection. Several of the small groups noted the difficulty involved in identifying indicators in the absence of goals and objectives for indicator development, as well as knowledge about the target audiences. One group suggested that their list was more of a "shopping list" than a set of common indicators. Another indicated that they did not reach consensus on their list.

---

<sup>3</sup> The list of indicators has been re-categorized to reflect the components of urban sustainability: social, environmental and economic.

**Table 6:  
Master List of Indicators Proposed by Workshop Participants**

CATEGORY / INDICATOR	Small Groups	Survey
<b>SOCIAL/CULTURE/INSTITUTIONAL</b>		
<b>1) Equity/Income/Distribution/Poverty</b>	✓	
• unemployment	✓	✓
• income distribution (% below poverty line)	✓	✓
• percentage poor living in census tracts with greater than 30% (concentration)	✓	
• socio-economic linkages	✓	
<b>2) Human Health</b>	✓	
• infant mortality/weight	✓	
• incidence of disease	✓	
• number of reported cases of cancer	✓	
• healthy household audit (number that "pass")	✓	
<b>3) Education</b>	✓	
• literacy rate	✓	✓
• % with high school diploma	✓	✓
• sustainability in school curricula	✓	
<b>4) Public Safety/Crime</b>	✓	✓
• walking alone at night	✓	
<b>5) Community Participation</b>	✓	✓
• % of populations voting in local elections	✓	✓
• lawn pesticide use	✓	
<b>6) Heritage/Culture</b>	✓	
• cultural opportunities	✓	✓
<b>7) Housing/Shelter Needs</b>	✓	
• accessibility	✓	✓
• variety (mix)	✓	✓
• affordability	✓	✓
• quality	✓	
<b>8) Government/Public Services</b>	✓	
• hard services provided	✓	
• soft services provided	✓	
• availability/accessibility of public services	✓	✓
• ability of community to provide public services	✓	

CATEGORY/INDICATOR	Small Groups	Survey
<b>ENVIRONMENT</b>		
<b>1) Air Quality</b>	✓	✓
• exceedance of standards	✓	✓
<b>2) Water Quality and Use</b>	✓	
• surface water quality	✓	✓
• ground water quality	✓	✓
• treatment (before and after use)	✓	✓
• recreational use	✓	
• % of population drinking bottled water and/or using water filters	✓	
• water consumption	✓	✓
<b>3) Soil Quality/Contamination</b>	✓	✓
<b>4) Ecosystems/Green space/Biota</b>	✓	
• access/distance to green space	✓	✓
• classifications	✓	
• % of land base that is green space	✓	
• green space per capita	✓	
• total amount of natural space	✓	
• ecology	✓	
• ecosystem integrity	✓	
• % of bird species that would be present if whole area remained natural	✓	
• presence of indicator species	✓	
<b>5) Land Use/Urbanization</b>	✓	
• density (change in net residential density)	✓	✓
• mixed use	✓	✓
• urban form	✓	✓
<b>6) Energy &amp; Resource Consumption/Conservation</b>	✓	
• energy consumption	✓	✓
• non-renewable energy use per capita	✓	
• land consumption	✓	
• product consumption	✓	
• per capita consumption	✓	
• efficiency	✓	
<b>7) Solid Waste</b>	✓	
• Generation	✓	✓
• Disposal	✓	
• Diversion	✓	✓

<b>CATEGORY/INDICATOR</b>	<b>Small Groups</b>	<b>Survey</b>
<b>ECONOMY</b>		
<b>Potential Economic Indicators</b>	✓	
• <b>employment (including diversity)</b>	✓	✓
• disposable income	✓	
• real purchasing power	✓	✓
• public debt	✓	
• dependency ratios	✓	
• office and retail availability	✓	

<b>CATEGORY/INDICATOR</b>	<b>Small Groups</b>	<b>Survey</b>
<b>INFRASTRUCTURE/INFLUENCING FACTORS</b>		
<b>1) Population</b>	✓	
• growth	✓	✓
<b>2) Transportation</b>	✓	
• modal splits	✓	✓
• expenditures	✓	
• commuting distance/time/mode	✓	✓
• vehicle kms. driven per year	✓	✓
• energy/pollution	✓	

Note: Categories/Indicators in bold type were referenced by two or more workshop discussion groups or five or more survey respondents.

While the workshop discussions did not produce a consensus on a set of appropriate indicators, there were common areas of agreement. Of the four small groups which identified indicators, all four suggested specific indicators or indicator categories pertaining to the following areas:

- equity/income distribution/poverty;
- education;
- public safety/crime;
- air quality;
- water quality and use;
- ecosystems/green space/biota;
- land use/urbanization;
- energy and resource consumption;
- economic;
- transportation.

Two categories were referenced by three of the four groups: human health and solid waste. Five categories -- community participation; heritage/culture; housing/shelter needs; government/public services; and population -- were referenced by two groups.

During the discussion on potential common indicators, there were several recurring issues, which will require further discussion and thought. These issues are summarized below.

**Should each common indicator have an accompanying benchmark, standard or national objective (eg. national air quality objective)?** Some participants felt that all indicators should have accompanying benchmarks or targets, while others suggested that this is not necessary. It was also suggested that comparison to national or provincial averages, where appropriate, could be undertaken.

**How many indicators should comprise the common set?** For example, the experience of the British Columbia Round Table's State of Sustainability Report (1994) suggests that approximately 80 indicators proved to be too many. There was general recognition among workshop participants of the need to find a balance between including enough indicators to provide a comprehensive assessment of progress towards urban sustainability, and limiting the number of indicators in view of shrinking human and financial resources. It was also noted that too many indicators reduce the impact on understandability for audiences, as well as use by policy makers.

**Is it possible to develop a set of indicators which is applicable for every scale and context?** Although there was general agreement among participants that a common set of indicators is desirable, this issue surfaced repeatedly during the workshop discussions. It may prove necessary to have different indicators that are most appropriate to a particular geographic scale, but still focusing on the same subject area.



### **Focus Questions for Discussion Group Participants:**

Should there be one set of core urban sustainability indicators which is applicable for a variety of purposes at different geographic scales? Should there be several sets of core urban sustainability indicators?

### ***Single Versus Multi-Pronged Approaches***

There was general support among participants for the development and use of a single national set of common urban sustainability indicators. This set of indicators should be developed at the national level through an inclusive, multi-stakeholder process (see also Section 5.4). The product of this process -- a menu of common indicators and use guidelines -- would be provided to provinces, municipalities, community groups and other use at the sub-national level. For example, municipalities would use the common set as a template which could be adjusted (i.e. indicators added) based on local needs, circumstances, goals, objectives, and community input. According to one small group, a key function of the common set would be to enable municipalities to measure their progress towards urban sustainability in the context of progress at the provincial, national and international levels.

Participants also suggested that the common set:

- should be useful at all levels - global, national, provincial and local;
- should address international needs for measuring urban sustainability at the global level;
- could provide a basis for comparison of urban sustainability across Canada and internationally; and
- be comprised of urban sustainability indicators that are:
  - practical, cost effective and measurable using common means (although some indicators should be included which are not easily measured),
  - linked, interrelated and integrated, and
  - developed to comparable levels of sophistication.

## 5.4 An Ongoing Process for Indicator Development

A recurring theme throughout the workshop was the need for an ongoing process to provide a foundation for the development and application of urban sustainability indicators in Canada. This process would build on the solid base of information and experience already available with respect to urban sustainability principles, objectives, frameworks, selection criteria and common indicators. Key characteristics of a sustainable process to develop a common set of national indicators, as identified by participants, are summarized below:

**Logical and sequential** - key process steps are as follows:

- i) establish a lead agency(s) and steering committee to direct the process and maintain momentum;
- ii) identify a definition and vision for urban sustainability in Canada;
- iii) select and adapt a set of principles, goals and objectives for developing a common set of urban sustainability indicators;
- iv) identify clients, users and target audiences;
- v) select an appropriate indicator framework or combination of frameworks;
- vi) determine the most important indicator selection criteria;
- vii) identify a common set of potential indicators and evaluate the indicators against selection criteria;
- viii) select a final set of common indicators;
- ix) municipalities adjust and use the common set of indicators, based on local needs, circumstances, goals, objectives, and community input;
- x) federal and provincial governments use common set for reporting purposes and compile municipal indicators.

**Action-oriented** - the process would facilitate stakeholders to identify and define issues; decide on targets/goals and priorities; develop and implement action plans; follow up and monitor results.

**Inclusive** - the process would enable broad-based participation by all sectors of society at appropriate stages in the process (visioning, objective-setting, review of indicators, etc.). Participating sectors would include all levels of government, non-government and community groups, and the private sector.

**Flexible** - to enable "looping back" and accommodate additional steps and actions, if appropriate.

**Leadership** - it was suggested that national leadership and guidance is needed to direct and facilitate the development of urban sustainability indicators in Canada. This leadership could be provided by one or more federal departments or other national organizations.

## 6. Exporting Our Knowledge

### 6.1 Applicability of a Common Set of Canadian Indicators at the International Level

In general, participants agreed that international organizations and countries around the world could benefit from the solid base of Canadian experience in developing and applying urban sustainability indicators, as demonstrated prior to and at the workshop. The international community could also benefit from possible future Canadian efforts to develop a common set of urban sustainability indicators. To be most relevant internationally, Canada's common indicators must relate to urban sustainability at the global level, as well as reflecting local progress on sustainability. It was suggested that Canada can play a lead role on the international stage if our common indicators reflect global needs.

#### Focus Questions for Discussion Group Participants:

How can Canada contribute in North America and internationally to measuring progress on urban sustainability using indicators?

To what extent is the UNCHS system of indicators meaningful in the Canadian context?

How can the UNCHS system be improved based on the Canadian experience?

Conversely, international indicator experience and expertise can provide an important input to the development of Canadian indicators. This is because the sustainability of Canadian urban areas cannot be viewed in isolation from the state of urban sustainability at the global level. However, not all indicators used globally are relevant to the Canadian situation, either at the national or municipal level.

## 6.2 Canada's Role in the United Nations Centre for Human Settlements' Indicators Programme

The United Nations Centre for Human Settlements' (UNCHS) Indicators Programme is a multi-national effort involving many countries around the world in the development and application of urban indicators. The UNCHS Programme is designed to enable participating countries to assess the sustainability of their urban areas using key indicators including 27 urban, 10 housing and 9 background indicators (see Table 7). The Programme will also assist countries in the preparation of reports for the Habitat II Summit in 1996. At Habitat II, indicators will be used as the major "currency" to help countries establish standards of urban performance, permitting comparisons of policy outcomes over time and space (UNCHS, 1995a). The UNCHS presenter was Joe Flood, Coordinator, Indicators Programme.

In the small group session which addressed Canada's role in the UNCHS Indicators Programme, there was general agreement that Canada should participate in this international indicator development initiative. Canadian participation helps us identify key areas for improvement, provides profile for issues of urban sustainability, and enables Canada to draw on information and data collected by others.

Several concerns were raised about Canada's participation, particularly relating to the data collected and assembled under the auspices of the Programme. It was noted that the level of aggregation of data may make it less relevant locally, and that there is a need for local community access to Programme data. It was stressed that effective administrative structures are needed to facilitate the smooth flow of Canadian data to the international level.

Concern was also expressed that some of the UNCHS indicators may not be particularly relevant in the Canadian context.

Participants also noted the need for improved cooperation and information sharing between the national, provincial and local levels in Canada, and within North America. It was suggested that the involvement of integrative institutions, such as the North American Commission on Environmental Cooperation (NACEC) could help to facilitate broader cooperation.

A number of specific suggestions were raised relating to potential contributions Canada could make to indicator development at the international level:

- Canadian expertise in remote sensing, Geographic Information Systems, and other areas could be used to facilitate international reporting;

**Table 7**  
**List of Key UNCHS Indicators**

<b>A. BACKGROUND DATA</b>	
Indicators D1: Land use Indicators D2: City population Indicators D3: Population growth rate Indicators D4: Woman headed households Indicators D5: Average household size	Indicators D6: Household formation rate Indicators D7: Income distribution Indicators D8: City product per person Indicators D9: Tenure type
<b>B. URBAN INDICATORS</b>	
<b>1. Socioeconomic Development:</b> Indicator 1: Households below poverty line Indicator 2: Informal employment Indicator 3: Hospital beds Indicator 4: Child mortality Indicator 5: School classrooms Indicator 6: Crime rates  <b>2. Infrastructure:</b> Indicator 7: Household connection levels Indicator 8: Access to potable water Indicator 9: Consumption of water Indicator 10: Median price of water, scarce season  <b>3. Transport:</b> Indicator 11: Modal split Indicator 12: Travel time Indicator 13: Expenditure on road infrastructure Indicator 14: Automobile ownership	<b>4. Environmental Management:</b> Indicator 15: Percentage of wastewater treated Indicator 16: Solid waste generated Indicator 17: Disposal methods for solid waste Indicator 18: Regular solid-waste collection Indicator 19: Housing destroyed  <b>5. Local Government:</b> Indicator 20: Major sources of income Indicator 21: Per-capita capital expenditure Indicator 22: Debt service charge Indicator 23: Local government employees Indicator 24: Wages in the budget Indicator 25: Contracted recurrent expenditure ratio Indicator 26: Government level providing services Indicator 27: Control by higher levels of government
<b>C. HOUSING INDICATORS</b>	
<b>6. Housing Affordability and Availability:</b> Indicator H1: House price to income ratio Indicator H2: House rent to income ratio Indicator H3: Floor area per person Indicator H4: Permanent structures Indicator H5: Housing in compliance	<b>7. Housing Provision:</b> Indicator H6: Land development multiplier Indicator H7: Infrastructure expenditure Indicator H8: Mortgage to credit ratio Indicator H9: Housing production Indicator H10: Housing investment

Source: UNCHS (1995b)

- Canada could be the host nation for a "global observatory" for urban sustainability;
- Canada could explore the development of urban sustainability indicators with its North American partners, under the auspices of NACEC and the NAFTA environmental side agreement;
- Canada could provide information to the global community on the "science" of sustainability, Canadian indicator development processes (including practical experience with indicator application and testing), and success stories; and
- Canada could stage an Internet conference on the topic of urban sustainability.

## 7. Next Steps and Conclusions

### 7.1 Participants' Recommendations for Next Steps

Throughout the workshop discussions and particularly during the final plenary session, participants provided suggestions on possible next steps for developing urban sustainability indicators in Canada. These next steps should build on the current Canadian indicators research and practice in the areas of quality of life, state of the environment and urban sustainability at all levels of government, Round Tables, and other agencies.

The key recommendations for next steps are summarized below:

1. Identify a **national organization(s) to take the lead role** in developing urban sustainability indicators, and promote opportunities for networking and information exchange among all levels of government, non-government and community organizations, and the private sector.
2. Establish an **ongoing process for indicator development** which involves stakeholders at all levels.
3. Develop a **menu of common indicators and use guidelines** to provide a template for use by municipalities, as well as provincial and national agencies.
4. Prepare a **resource and how-to guide for municipalities** to facilitate the initiation and maintenance of local indicator development and use.
5. Create an **information sharing network**, possibly on the Internet, to promote dialogue and networking about urban sustainability.

### 7.2 Co-Chairperson's Concluding Remarks

At the conclusion of the workshop, Co-Chairperson Douglas Stewart, Vice-President, Policy and Research, CMHC provided closing remarks on behalf of the workshop organizers. In his remarks, Co-Chairperson Stewart highlighted some of the key issues raised during the workshop:

- It is very important to develop a **vision and specific objectives for a sustainable urban future**, whether it be at the national, regional or local level. Without this context, it is impossible to identify a set of credible, relevant indicators.



- **Communications** is a key element in developing urban sustainability indicators. There is a clear need to identify the target audience, to understand their needs and perspectives, and the context in which they will use the indicators.
- There is a concern among indicator practitioners about the **quality and availability of data** needed to support indicator development.
- It is important to identify "**actionable**" indicators that can be implemented in a **cost effective** way.
- There is a need to recognize and work within the constraints imposed by the limited resources available for indicator development, particularly in smaller communities. In view of scarce resources, there is a **tremendous opportunity to work collectively to identify common indicators** and pool resources and efforts aimed at collecting and interpreting data to support these indicators.

## References

British Columbia Round Table on the Environment and the Economy (1994). **State of Sustainability: Urban Sustainability and Containment**. (Victoria: Crown Publications).

D'Amour, David (1991). **Sustainable Development and Housing, Research Paper No. 1**. (Ottawa: Canada Mortgage and Housing Corporation).

Environmental Protection Agency. (1972). **Quality of Life Indicators**. (Washington D.C.)

Jacksonville Community Council (1992). **Life in Jacksonville: Quality Indicators for Progress**. (Jacksonville, Florida: Jacksonville Chamber of Commerce).

Maclaren, Virginia W. with the assistance of Sonia Labatt, Jennifer McKay and Michael Vande Vegte (1995). **Developing Indicators of Urban Sustainability: A Focus on The Canadian Experience** Prepared for Environment Canada; Canada Mortgage and Housing Corporation; Intergovernmental Committee on Urban and Regional Research for *Measuring Urban Sustainability: Canadian Indicators Workshop, June 19-21, 1995*. (Toronto: ICURR Press).

Metropolitan Toronto Planning Department (1991). **Towards a Liveable Metropolis** (Toronto: Metropolitan Toronto Planning Department).

Metropolitan Toronto Planning Department (1995). **State of the Environment Report: Metropolitan Toronto** (Toronto: Metropolitan Toronto Planning Department).

Murdie, R.A., Rhyne, D. and Bates, J. (1992). **Modelling Quality of Life Indicators in Canada: A Feasibility Analysis**. (Ottawa: Canada Mortgage and Housing Corporation).

Murdie, R.A., Rhyne, D. and Bates, J. (1992). **Modelling Quality of Life Research: An Annotated Bibliography**. (Ottawa: Canada Mortgage and Housing Corporation).

Organisation for Economic Cooperation and Development (OECD). (1994). **Environmental Indicators: OECD Core Set**. (Paris).

Rees, W.E. and M. Wackernagel. (1994). Ecological Footprints and Appropriated Carrying Capacity: Measuring the Natural Capital Requirements of the Human Ecology. pages 362-390 in **Investing in Natural Capital: The Ecological Economics Approach to Sustainability**. A.M. Jansson, M. Hammer, C. Folke, and R. Costanza eds. (Washington, D.C.: Island Press).

Richardson, Nigel (1989). **Land Use Planning and Sustainable Development in Canada**. Prepared for the Canadian Environmental Advisory Council. (Ottawa: Minister of Supply and Services Canada).

United Nations Centre for Human Settlements (UNCHS), (1995a). **Indicators Programme: Monitoring Human Settlements, Volume 1 - Introduction Background and Rationale.** (Nairobi, Kenya: UNCHS and the World Bank).

United Nations Centre for Human Settlements (UNCHS). (1995b). **Indicators Programme: Monitoring Human Settlements: Key Indicators - Abridged Survey.** (Nairobi, Kenya: UNCHS and the World Bank).

World Commission on Environment and Development (WCED), (1987). **Our Common Future.** (New York: Oxford University Press).



**APPENDIX A: WORKSHOP PROGRAM**

**PROGRAM IN DETAIL**

**MEASURING URBAN SUSTAINABILITY:  
CANADIAN INDICATORS WORKSHOP**

**MONDAY, JUNE 19th**

*4:30 p.m.-7:00 p.m. Registration, Foyer, 27th floor, Metro Hall*

*7:00 p.m. Opening Plenary.  
Overview of Canadian Experience.*

**Welcoming Remarks from Host Municipality, Metropolitan  
Toronto.**

John Gartner  
Commissioner  
the Municipality of  
Metropolitan Toronto

**Chairperson's Remarks, Challenges and Criteria for Success of  
Workshop**

Robert W. Slater,  
Assistant Deputy Minister,  
Environmental Conservation Service,  
Environment Canada

**National Overview of Canadian Urban Sustainability Indicators  
Experience: Issues and Questions.**

Virginia Maclaren  
Department of Geography  
University of Toronto.

**Commentary by Discussant**

Susan Holtz  
National Round Table on  
the Environment and Economy.

**Questions and Comments.**

9:00 p.m.

*Reception.*  
*Sponsored by Environic Research Group Ltd.*

**TUESDAY, JUNE 20th**

8:00 a.m.

*Coffee, muffins and juice for delegates*

8:30 a.m.-10:00 a.m.

**Morning Plenary Session.**  
**National Urban Sustainability Indicators Programs.**

**Chairperson's Remarks**

Douglas A. Stewart,  
Vice-President, Policy and Research  
Canada Mortgage and Housing Corporation

**National Urban Environmental Indicators,  
Framework and Applications.**

Anne Kerr  
Director, Indicators Branch  
State of the Environment Directorate  
Environment Canada.

**Urban Quality of Life Indicators, Framework and Applications.**

Denys Chamberland  
Acting Manager  
Centre for Future Studies in Housing and Living Environments  
Canada Mortgage and Housing Corporation

**Open Plenary Discussion.**

10:00 a.m.

*Health Break.*

10:15 a.m.-noon

**Small Group Discussions (1).**  
**Urban Sustainability: Characteristics, Priority Issues and  
Indicators Selection Criteria.**

Discussion of the concept of urban sustainability, its key characteristics and priority issues, leading to the identification of selection criteria for developing a core set of sustainability indicators applicable to urban centres.

noon -1:30 p.m.

*Lunch Session*

*Hosted by the Office of the Greater Toronto Area.*

**The Indicators System for Monitoring Human Settlements.**

Joe Flood

Coordinator, Indicators Programme

United Nations Centre for Human Settlements

(HABITAT)

1:30 p.m.-3:30 p.m.

**Afternoon Plenary Session.**

**Municipal/Community Indicators in Canada.**

1:50 p.m.

**Chairperson's remarks**

Douglas A. Stewart

Vice-President, Policy and Research

Canada Mortgage and Housing Corporation

2:00 p.m.

**Municipal/Community Indicators Programs**

**Hamilton-Wentworth: Community Indicators**

Mary Ellen Scanlon

Senior Planner

Regional Municipality of Hamilton-Wentworth

**Greater Toronto Area: Quality of Life Indicators**

John Gladki

Director

Programs, Policy and Research

City of Toronto

**Metropolitan Toronto: State of the Environment Indicators**

John Barr

Director, Research and Special Studies Division

Municipality of Metropolitan Toronto

**British Columbia Round Table: Urban Sustainability Indicators Report**

David Harper

President

Westland Resource Group



**Abbotsford, B.C. The Challenge of Developing Indicators in  
Smaller Municipalities**

Peter Andzans  
Environmental Manager  
City of Abbotsford

**Open Plenary Discussion.**

3:30 p.m.

*Health Break.*

3:45 p.m.-5:15 p.m.

**Small Group Discussion (2):  
Indicators Identification.**

Based on earlier discussions and presentations on municipal/urban experience, develop an approach and identify a core set of urban sustainability indicators giving heed to selection criteria, data availability, issues and linkages (socio-economic, health and environmental).

Evening

Open

**WEDNESDAY, JUNE 21st**

8:00 a.m.

*Coffee, muffins and juice for delegates.*

8:30 a.m.-9:45 a.m.

**Morning Plenary Session.  
Core Set of Urban Sustainability Indicators:  
Frameworks, Selection Criteria.**

**Chairperson's Remarks**

Robert W. Slater  
Assistant Deputy Minister, Environmental Conservation Service  
Environment Canada.

Reports from small group discussions (2) by the rapporteurs on a core set of urban sustainability indicators, reasons for selection, most pertinent criteria, issues or problems that arose.

**Participants' Comments on Reports.**

9:45 a.m.

*Health Break.*

10:00 a.m.-11:45 a.m.

**Small Group Discussions (3).  
Indicator Implementation.**

**Group A UNCHS Indicators.**

The UNCHS Indicators Programme has developed a system for monitoring human settlements. This group will explore the UNCHS system in the context of its applicability to Canadian urban areas and will make recommendations for its further development.

**Group B Core Indicators: Single versus Multi-Pronged  
and E Approaches.**

These groups will discuss the advantages and disadvantages of developing one set of core indicators of urban sustainability or different sets based on the purpose of application, and on the geographic scale: national, large city, smaller centre.

**Group C Core Indicators: Guidelines and Criteria.**

Drawing from earlier workshop discussions, this group will discuss possible guidelines and criteria for core indicators development and application.

**Group D Applications of Urban Sustainability Indicators.**

This group will identify and evaluate specific applications of urban sustainability indicators, consider data availability problems, and identify information gaps and challenges in applying indicators in urban areas.

11:45 a.m.-1:30 p.m.

*Buffet Lunch*

1:30 p.m.-2:50 p.m.

**Afternoon Plenary Session.  
Contributions to the Development of Urban Sustainability  
Indicators in Canada and Internationally.**

**Chairperson's Remarks.**

Robert W. Slater

Assistant Deputy Minister, Environmental Conservation Service  
Environment Canada.

**Reports by Rapporteurs from Small Group Discussion (3)**

- A) UNCHS Indicators
- B) Core Indicators: Single versus Multi-Pronged Approaches
- C) Core Indicators: Guidelines and Criteria
- D) Applications of Urban Sustainability Indicators
- E) Core Indicators: Single versus Multi-Pronged Approaches

**Participant's Comments**

2:50 - 3:00 p.m.

*Health Break*

3:00 p.m.- 3:40 pm.

**Closing Plenary Session.**

**Chairperson's Remarks**

Douglas A. Stewart  
Vice-President, Policy and Research  
Canada Mortgage and Housing Corporation

**Summary and Synthesis by Workshop Rapporteur.**

Sally Leppard  
President  
LURA Group

**Closing remarks**

3:40 p.m.

**End of workshop.**

**APPENDIX B: ISSUES IN DEVELOPING INDICATORS OF  
URBAN SUSTAINABILITY**



**ISSUES IN DEVELOPING INDICATORS OF URBAN SUSTAINABILITY**

Prepared for :

**MEASURING URBAN SUSTAINABILITY:  
CANADIAN INDICATORS WORKSHOP**

June 19-21, 1995  
Toronto, Canada

Canada Mortgage and  
Housing Corporation

Environment  
Canada

The overview paper for this workshop identifies a number of key issues that need to be addressed in order to move forward on the development of urban sustainability indicators and urban sustainability reporting. This paper briefly summarizes those issues, most of which will be the focus of group discussions. The sessions in which the issues are most likely to be discussed are noted.

## **ISSUE NO. 1: IMPORTANT CHARACTERISTICS OF URBAN SUSTAINABILITY (Session 1)**

*Is there a common definition of urban sustainability that should be used when developing indicators of urban sustainability?* There are many definitions of urban sustainability and related concepts that can be found in the academic literature and government documents. The definition of sustainability used in developing urban sustainability indicators will clearly affect the types of indicators that are ultimately selected. There is fairly wide-spread agreement that the concept of urban sustainability centres around the inclusion of environmental considerations in the urban policy debate. It requires an understanding of the relationships among the environment, the economy and society. Inter-generational equity is a central principle. There is less agreement on the relative importance of environmental considerations in comparison to economic and social considerations, and on the other principles that should be included in sustainability, such as carrying capacity, community empowerment, and self-reliance.

*A related issue is whether sustainability should be defined on the basis of generic goals or community specific goals.* Rather than debating the technical aspects of sustainability, should the first step in community-based exercises for indicator selection instead focus on simpler concepts, such as: *"What makes our community a nice place to live in? What should our community look like in the future?"*

## **ISSUE NO. 2: INDICATOR FRAMEWORKS (Session 1)**

*Which indicator framework offers the most promise for developing urban sustainability indicators?* The working paper identifies frameworks used to develop environmental indicators, quality of life indicators, healthy city indicators, and sustainability indicators. Three types of frameworks were found to be most common. The first is a *theme-based framework* in which the themes or principles of sustainability drive the classification of indicators into different categories. For example, the united Kingdom's Local Government Management Board chose carrying capacity and quality of life as its broad principles of sustainability and then identified theme areas for each broad principle.

The second common approach is to use a framework originating from state of the environment reporting, known as *condition-stress-response (or condition-stress-societal response) framework*. The underlying concept for this framework is that stressors arising from human activities affect environmental conditions, which in turn impact on economic, health, and social conditions. Policy responses can alleviate the stressors or modify environmental conditions directly through restoration or clean-up programs. Adding economic and social conditions to the range of conditions that can be affected by human activities expands the original condition-stress-response framework so that it can be used in a sustainability context. This framework is an improvement over the theme-based framework because it attempts to look at linkages between environment, economy and society, and it recognizes cause-effect relationships.

A third framework arises from the quality of life literature. Known as the *Community Oriented Model of the Lived Environment (COMLE)*, this framework begins by identifying areas of municipal government responsibility, such as housing and transportation. It then links these areas of responsibility to three theme areas: Environmental integrity, economic vitality and social well-being. This framework is an improvement over the simple theme-based framework because of its urban-based focus that explicitly recognizes the tie between municipal government activities and the environmental, social, and economic aspects of quality of life.

*An ideal framework for developing urban sustainability indicators may well incorporate elements of all three general types of frameworks identified here.* For example, the framework might require that all indicators be linked with urban sustainability principles, that the indicators be selected to cover a broad range of conditions, stressors and responses, and that the indicators be relevant for municipal government programs. Another variation, which has been used by Sustainable Seattle and is now being used by the Regional Municipality of Hamilton-Wentworth, emphasizes indicators that are relevant for individuals in the community rather than for municipal government programs.

### ISSUE NO. 3: INDICATOR SELECTION CRITERIA (Sessions 1 and 2)

*Which indicator selection criteria should be used when identifying urban sustainability indicators? Are some selection criteria more important than others? If so, which ones are more important and how would their relative importance be determined?* The background report identifies 12 criteria that are commonly used in selecting indicators. They include: scientific validity; representativeness; relevance to stated goals; accuracy, accessibility and availability of data; understandable by potential users; ability to provide early warnings of potential change; comparable to thresholds or targets; comparable with indicators developed in other jurisdictions; cost effective to collect and use; and attractive to the media. *Should all of the criteria be used when selecting sustainability indicators? Are some necessary? Are some missing?*



It may be impossible to find indicators that satisfy all of the above criteria. *Consequently, judgments will have to be made about the relative importance of different criteria.* Criteria may have to be applied sequentially. There may be trade-offs between the criteria. For example, is scientific validity a prerequisite for sustainability indicators, or should the prime consideration be the selection of indicators which have meaning to individuals in the community? Should data availability limitations exclude certain otherwise desirable indicators from consideration?

#### **ISSUE NO. 4: A CORE SET OF INDICATORS (Session 2, Session 3)**

*Is it desirable to have a "core" set of urban sustainability indicators that can be used by all municipalities in Canada? If so, how many indicators should be included in this core set and how should they be selected?* One advantage of having a core set of urban sustainability indicators is that it will provide municipalities with much-needed guidance on how to measure urban sustainability. It will also allow municipalities to compare their progress towards sustainability with the progress being achieved by other municipalities and permit reporting on a national basis with comparable data. This latter advantage may also be considered by some to be a disadvantage because some municipalities may not want to be compared with others. Another disadvantage of having a single set of core indicators is that changes and conditions in one community, say a large, industrialized community, may not be comparable to changes in a smaller, rural community, therefore, a single set of indicators might not be appropriate for all community types or all geographic scales from local to national and international. On the other hand, it may be possible to identify groups of communities with similar social, economic and environmental characteristics for which common indicators are appropriate.

Another consideration in designing a core set is the number of indicators to be included. *Too few indicators may not be able to capture all of the essential elements of urban sustainability, while too many indicators may be overwhelming from the point of view of data collection, communication and synthesis.* One alternative to developing a core set of indicators may be to develop a fairly large menu of indicators from which individual municipalities can select a smaller number of indicators that are appropriate for local conditions. A disadvantage of this menu approach is the lack of even a basic ability to make comparisons.

#### **ISSUE NO. 5: WHO DECIDES AND WHO IS THE TARGET AUDIENCE? WHAT IS THE SPECIFIC PURPOSE OR APPLICATION FOR THE INDICATORS? (Session 3)**

*Who should be involved in identifying and choosing urban sustainability indicators? How does the choice of indicators vary with the target audience and with the proposed application?* The Canadian experience in identifying urban sustainability indicators to date has relied heavily on a multistakeholder decision-making process. In British Columbia, the provincial Round Table

guided the indicator selection process. In Environment Canada, a Public Advisory Committee and a broad cross-section of stakeholders have assisted in indicator selection, while in Hamilton-Wentworth, the entire indicator selection process was community-driven from the beginning. An alternative approach might make government staff solely responsible for selecting indicators. This is an approach that has been used in the preparation of some municipal and provincial state of the environment reports in Canada. Which approach is most suitable for selecting indicators or is there a process ranging between these two alternatives? Will the approach chosen vary depending on the needs of the community?

*A related issue is whether and how the choice of indicators will vary with the target audience.* When the target audience is individuals in the community, indicators that are understandable and meaningful to the individual may be essential. When the target audience is municipal politicians, performance indicators for government programs and policies may be more important. Which audience should be the target for a "core" set of urban sustainability indicators?

#### **ISSUE NO. 6: "FORWARD LOOKING" INDICATORS (Session 3)**

*How can "forward-looking" indicators be constructed?* A key principle underlying urban sustainability is inter-generational equity. Many practitioners and academics suggest that "forward-looking" indicators will be needed in order to measure progress towards achieving inter-generational equity. One way of constructing a forward-looking indicator is to relate the indicator to a desired future state designated by a target or standard. Typical targets used at the municipal level have included waste reduction targets or carbon emissions reduction targets (e.g. reduce by 50% by the year 2000). Typical standards are air quality and water quality standards. The difference between the current level of an indicator and the desired future state is a measure of the distance away from sustainability. Another way to formulate a forward-looking indicator is to use a form of scenario development that asks the question: "If a given indicator achieves or is set at a certain level, what will the level of an associated indicators be in the future?". In these instances described, the actual indicator is similar to an indicator of current conditions, it is the context in which it is applied that makes the indicator "forward-looking". Other approaches may also exist for designing forward-looking indicators.

#### **ISSUE NO. 7: COMPOSITE INDICATORS (Session 3)**

*Should attempts be made to develop composite indicators or indexes of sustainability?* The major advantage of a composite indicator is that it can reduce a great deal of information to a single number. It may therefore be a highly useful way of presenting environmental, economic and social indicator data simultaneously. Although composite indicators have been used (e.g., UNDP Index, air quality and quality of life) several methodological problems can be encountered when attempting to apply them. For instance, alternative ways of combining the individual

indicators into a composite indicators can produce different index values from the same original data. Judgments must be made about the relative importance of individual indicators in a composite indicators and how they will be weighted. The final index value will depend on the relative weights assigned and, therefore, on who is making the judgments. Standardization methods must be used when aggregating indicators that are measured in different units. Alternative standardization methods can produce different index values from the same original data. Finally, composite indicators can be difficult to understand and can hide changes in individual indicators.

#### **ISSUE NO. 8: GOOD SUSTAINABILITY INDICATORS (Session 2)**

*What are some of the best examples of good urban sustainability indicators?* The overview paper provides 16 examples of sustainability indicators but notes that many other and possibly better examples of indicators exist. The results of the workshop core indicators survey provides additional examples. Which are the best?

Prepared by:

Virginia W. Maclaren  
Department of Geography  
Program in Planning  
University of Toronto  
with input from the Workshop Planning Committee

**APPENDIX C: SELECTED READINGS**



## Selected Readings

Campbell, Monica and Virginia Maclaren (1995). **Municipal State of the Environment Reporting in Canada: Current Status and Future Needs. Occasional Paper Series, No. 6.** (Ottawa: Environment Canada, State of the Environment Directorate).

Corporation of the District of Matsqui (1990). **Environment Policy Report.** Matsqui, British Columbia

Environment Canada (1991). **A Report on Canada's Progress Towards a National Set of Environmental Indicators.** (Ottawa: Environment Canada, State of the Environment Reporting Branch).

Environment Canada (1994). **Urban Water: Environmental Indicator Bulletin and Technical Supplement No. 94-1.** (Ottawa: Environment Canada, State of the Environment Directorate).

Environment Canada (1994). **Urban Air Quality: Environmental Indicator Bulletin and Technical Supplement No. 94-2.** (Ottawa: Environment Canada, State of the Environment Directorate).

Environment Canada (1995). **Canadian Passenger Transportation: Environmental Indicator Bulletin and Technical Supplement No. 95-3.** (Ottawa: Environment Canada, State of the Environment Directorate).

Fraser Basin Management Program (1995). **Board Report Card: Assessing Progress Towards Sustainability in the Fraser Basin.** (Vancouver: Fraser Basin Management Board).

Government of Canada (1991). **The State of Canada's Environment.** (Ottawa: Environment Canada, State of the Environment Reporting Branch).

Healthy City Toronto (1994). **A Statement for Developing Healthy City Indicators** (Toronto: Healthy City Office, City of Toronto).

Houston, D. and Ferguson, P. (1992). **Indicators of Environmental Quality and Environmental Sustainability for the City of Toronto.** Report prepared for the Healthy City Office, City of Toronto.

Regional Municipality of Hamilton-Wentworth, Regional Chairman's Task Force on Sustainable Development (1992) **Vision 2020: The Sustainable Region** (Hamilton: Regional Municipality of Hamilton-Wentworth).

Regional Municipality of Hamilton-Wentworth, Regional Chairman's Task Force on Sustainable Development (1993b) **Implementing Vision 2020: Detailed Actions and Strategies for Creating a Sustainable Region** (Hamilton: Regional Municipality of Hamilton-Wentworth).

Regional Municipality of Hamilton-Wentworth, Regional Chairman's Task Force on Sustainable Development (1994) **Hamilton-Wentworth's Sustainable Community Initiative: Project Summary** (Hamilton: Regional Municipality of Hamilton-Wentworth).

Regional Municipality of Hamilton-Wentworth, Regional Chairman's Task Force on Sustainable Development (1994) **Signposts on the Trail to Vision 2020: Revised Project Outline**. (Hamilton: Regional Municipality of Hamilton-Wentworth).

Regional Municipality of Hamilton-Wentworth, Regional Chairman's Task Force on Sustainable Development (1994) **State of the Environment 1994 Update** (Hamilton: Regional Municipality of Hamilton-Wentworth).

**APPENDIX D: LIST OF WORKSHOP PARTICIPANTS/  
SESSION CHAIRPERSONS/ SESSION RAPPORTEURS**





**SESSION**  
**CHAIRPERSONS**

Jim Thoms  
Ron Nielson  
Normand Brunet  
Rodney White  
Doug Hyde  
Linda Thorstad  
John Hartman  
Stephen Pomeroy  
Jack Smugler  
Peter Hardi

**SESSION**  
**RAPORTEURS**

Peter Fay  
Douglas G. Glenn  
David Brown  
Eric Hellman  
Anna Hercz  
Lisa Salsberg  
William Lambert  
Robert Murdie  
Mary Neumann  
George Francis

## Workshop Participants

Peter Andzans  
Environmental Manager,  
City of Abbotsford  
32315 South Fraser Way  
Abbotsford, B.C. V2T 1W7

John Barr  
Director, Planning Department  
The Municipality of Metropolitan Toronto  
55 John Street  
Toronto, ON M5V 3C6

Meredith Beresford  
A/Assistant Deputy Minister  
The Greater Toronto Area  
Ministry of Municipal Affairs  
10 Bay Street, Suite 300  
Toronto, ON M5J 2R8

Whitney Birch  
Policy Advisor  
The Greater Toronto Area  
Ministry of Municipal Affairs  
10 Bay Street, Suite 300  
Toronto, ON M5J 2R8

Heather Blenkiron  
Research Assistant  
Environment Canada  
9th Floor, Place Vincent Massey  
351 St. Joseph Blvd.  
Hull, PQ K1A 0H3

Wayne Bond  
Urban Ecozone Coordinator  
Environment Canada  
9th Floor, Place Vincent Massey  
351 St. Joseph Blvd.  
Hull, PQ K1A 0H3

David F. Brown  
Associate Professor  
School of Urban Planning  
McGill University  
815 Sherbrooke Street West  
Montreal, PQ H3A 2K6

Jeb E. Brugmann  
Secretary General  
International Council for Local  
Environmental Initiatives  
City Hall, East Tower, 8th Floor  
Toronto, ON M5H 2N2

Normand Brunet  
Biologiste  
10535 rue Tanguay  
Montréal, PQ H3L 3G9

Lise Cardinal  
Médecin-Conseil, Santé Publique  
Centre Hospitalier de l'Université Laval  
525, boul. Wilfrid-Hamel est  
Québec, PQ G1M 2S8

Denys Chamberland  
A/Manager  
Centre for Future Studies in  
Housing and Living Environments  
CMHC, 700 Montreal Road  
Ottawa, ON K1A 0P7

Anne-Marie Charlebois  
Institut national de la recherche scientifique  
3465 rue Durocher  
Montréal, PQ H2X 2C6

Debra Darke  
Director  
Research Division  
CMHC, National Office  
700 Montreal Road  
Ottawa, ON K1A 0P7

David Dilks  
Partner  
LURA Group  
3 Church Street, Suite 400  
Toronto, ON M5F 1M2

## Workshop Participants

Norman S. Dong  
Special Assistant, HUD  
Office of Policy Development and Research  
451 Seventh Street S.W.  
Washington, D.C. 20410

Peter Fay  
The Municipality of Metropolitan Toronto  
55 John Street, 22nd Floor  
Toronto, ON M5V 3C6

Natasha Feder  
Population Committee Coordinator  
Conservation Council of Ontario  
489 College Street, Suite 506  
Toronto, ON M6G 1A5

Joe Flood  
Coordinator  
Indicators Programme  
U.N. Centre for Human  
Settlements (HABITAT), B.O.  
Box 30030, Nairobi, Kenya

George Francis  
Professor  
University of Waterloo  
200 University Avenue West  
Waterloo, ON N2L 3G7

John Gartner  
Commissioner  
The Municipality of Metropolitan Toronto  
55 John Street  
Toronto, ON M5V 3C6

Richard Gilbert  
Consultant  
15 Borden Street  
Toronto, ON M5S 2M8

John Gladki  
Director  
Programs, Policy and Research  
City of Toronto  
City Hall  
Toronto, ON M5Z 2N2

Douglas G. Glenn  
Senior Environmental Health Officer  
Vancouver Health Department  
City of Vancouver  
1770 West 7th Avenue  
Vancouver, B.C. V6J 4Y6

David Gurin  
Deputy Commissioner, Planning Department  
The Municipality of Metropolitan Toronto  
55 John Street, 22nd Floor  
Toronto, ON M5V 3C6

Andrew Hamilton  
North American Commission on  
Environmental Cooperation  
393 rue St. Jacques W.  
Montreal, PQ

Trevor Hancock  
Public Health Consultant  
28 Napier Street  
Kleinburg, ON L0J 1C0

Peter Hardi  
International Institute for  
Sustainable Development  
161 Portage Avenue East  
Winnipeg, MB R3B 0Y4

David E. Harper  
Director, Planning Division  
Westland Resource Group  
1863 Oak Bay Avenue  
Victoria, B.C. V8R 1C6

## Workshop Participants

John Hartman  
Secretary  
Urban Transportation Council  
Transportation Association Canada  
2323 St. Laurent Blvd.  
Ottawa, ON K1G 4K6

Eric Hellman  
Consultant  
New Age Communications  
12 Raglan Avenue  
Toronto, ON M6C 2K6

Anna V. Hercz  
Senior Policy Analyst  
Environmental Management  
City of Ottawa  
111 Sussex Drive  
Ottawa, ON K1N 5A1

Susan Holtz  
Consultant  
Stanbrae Road, Ferguson's  
Cove, Box 49, Site 15  
RR # 5, Armdale, NS B3L 4J5

Don Houston  
Consultant  
DSH Ecologics  
219 Seaton Street  
Toronto, ON M5A 2T5

Susan Howard  
Environment Canada  
8th Floor, Place Vincent Massey  
351 St. Joseph Blvd.  
Hull, PQ K1A 0H3

Doug Hyde  
Associate  
Resource Futures International  
Suite 406  
1 Nicholas Street  
Ottawa, ON K1N 7B7

Shaheen Kassim-Lakha  
Environmental Epidemiologist  
Public Health Department  
East Tower, City hall  
100 Queen Street, 6th Floor  
Toronto, ON M5H 2N2

Anne Kerr  
Director, Indicators Branch  
Environment Canada  
9th Floor, Place Vincent Massey  
351 St. Joseph Blvd.  
Hull, PQ K1A 0H3

Christine Kowalyk  
Senior Planner  
Municipal Planning Policy Branch  
13th Floor, 777 Bay Street  
Toronto, ON M5G 2E5

Michael Lahr  
Centre for Urban Policy Research  
Rutgers University  
Kelmer Campus, Building 4051  
New Brunswick, NJ 08903

William G. Lambert  
Director of Planning  
Regional Municipality of Waterloo  
150 Frederick Street, 5th Floor  
Kitchener, ON N2G 4J3

Neely Law  
University of Toronto  
Department of Geography  
100 St. George  
Toronto, ON M5S 1A4

Derek Leebosh  
Senior Research Associate  
Environics Research Group Ltd.  
7th Floor  
45 Charles Street E.  
Toronto, ON M4Y 1S2

## Workshop Participants

Dick Leong  
Policy Analyst  
CMHC, National Office  
700 Montreal Road  
Ottawa, ON K1A 0P7

Sally Leppard  
President  
LURA Group  
3 Church Street, Suite 400  
Toronto, ON M5F 1M2

Wendy Luther  
Communications Coordinator  
Conservation Council of Ontario  
489 College Street, Suite 506  
Toronto, ON M6G 1A5

Virginia W. Maclaren  
Associate Professor  
University of Toronto  
Department of Geography  
100 St. George Street  
Toronto, ON M5S 1A1

Claude Marchand  
Directrice de la Recherche  
Comité Intergouvernemental de Recherches  
150 Eglinton Avenue East, # 301  
Toronto, ON M4P 1E8

David Miller  
Environmental Planner  
Regional Municipality of Ottawa-Carleton  
2nd Floor N., 111 Lisgar Street  
Ottawa, ON K2P 2L7

René Morency  
Conseiller en Planification  
Ville de Québec  
2 rue des Jardins  
Québec, PQ G1R 4S9

John Moses  
U.S. Environmental Protection Agency  
401 M Street S.W., Code 2163  
Washington, D.C. 20460

Robert A. Murdie  
Associate Professor  
York University, Department of Geography  
4700 Keele Street  
North York, ON M3J 1P3

Mary Neumann  
Facilitator  
Ministry of Municipal Affairs  
12th Floor, 777 Bay Street  
Toronto, ON M5G 2E5

Ron Nielsen  
Policy Coordinator  
ORTEE  
1 Dundas Street West, # 2502  
P.O. Box 4  
Toronto, ON M5G 1Z3

Jeffrey Patterson  
Lecturer  
University of Winnipeg  
Urban/Environmental Studies  
483 Stiles Street  
Winnipeg, MB R3G 3A5

Steven Peck  
Director  
Environmental Consulting Services  
Thompson, Gow and Associates  
1 Toronto Street, Suite 806  
Box 19  
Toronto, ON M5C 2V6

Frances Perkins  
Corporate Director  
Healthy City Toronto  
20 Dundas Street West  
Suite 1036, Box 22  
Toronto, ON M5G 2C2

## Workshop Participants

Steve Pomeroy  
Managing Director  
Focus Consulting  
40 Java Street  
Ottawa, ON K1Y 3L3

Ron Rice  
Professor  
School of Urban Planning  
McGill University  
815 Sherbrooke Street West  
Montréal, PQ H3A 2K6

Kevin Ritchie  
Researcher  
Region of Peel  
10 Peel Centre Drive  
Brampton, ON L6T 4B9

Ian Rutherford  
Director General  
Environment Canada  
9th Floor, Place Vincent Massey  
351 St. Joseph Blvd.  
Hull, PQ K1A 0H3

Brenda J. Sakauye  
City Environmental Coordinator  
Transportation and Works  
City of Mississauga  
3484 Semenyk Court  
Mississauga, ON L5C 4R1

Lisa Salsberg  
Planner  
Healthy City Office  
City of Toronto  
20 Dundas Street W.  
# 1036, Box 22  
Toronto, ON M5G 2C2

Mary Ellen Scanlon  
Policy Analyst, Strategic Planning  
Regional Municipality of  
Hamilton - Wentworth  
119 King Street West, 14th Floor  
Hamilton, ON L8P 4T9

Lynne Simons  
Planner, Planning and Development  
Region of Halton  
1151 Bronk Road  
Oakville, ON L6M 3L1

Robert W. Slater  
Assistant Deputy Minister  
Environment Canada  
15th Floor, Place Vincent Massey  
351 St. Joseph Blvd.  
Hull, PQ K1A 0H3

Jack Smugler  
Senior Officer  
Habitat 11  
CMHC, National Office  
700 Montreal Road  
Ottawa, ON K1A 0P7

Douglas A. Stewart  
Vice-President  
Policy and Research  
CMHC, National Office  
700 Montreal Road  
Ottawa, ON K1A 0P7

James Sullivan  
Research Associate  
Taskforce on the Churches  
and Corporate Responsibility  
129 St. Clair Avenue W.  
Toronto, ON M4V 1N5

Jim Thoms  
Commissioner of Planning and Development  
Regional Municipality of  
Hamilton - Wentworth  
14th Floor, 119 King Street W.  
Hamilton, ON L8N 3T4

Linda Thorstad  
Project Coordinator  
Fraser River Basin Management Programme  
Box 10086, Suite 2970  
700 West Georgia Street  
Vancouver, B.C. V7Y 1B6

## Workshop Participants

Rodney White  
Director, Environmental Studies  
University of Toronto  
170 College Street  
Toronto, ON M5S 1A4

Joanne Zanin-Minkiewicz  
Planner  
The Regional Municipality of Durham,  
Box 623, 1615 Durdas  
4th Floor, Lang Tower West Building  
Whitby, ON L1N 6A3



ENVIRONMENT CANADA LIBRARY

YELLOWKNIFE



4004424