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पर्यावरण संरक्षण और जैव विविधता

डॉ सीताराम आठिया

स्वास्थ्य पर्यवेक्षक: सामुदायिक स्वास्थ्य केन्द्र देवरी जिला सागर, म प्र पिनकोड

संबद्ध:- डॉ हरीसिंह गौर केंद्रीय विश्वविद्यालय सागर मप्र

सारांश:

आज सारे विश्व में पर्यावरण को लेकर चिंता है। डगमगाता पर्यावरण हमें आने वाले भयावह खतरे की चेतावनी दे रहा है। वनों की अंधाधुंध कटाई, ग्लोबल वार्मिंग, औद्योगिकीकरण और भूमिक्षरण से पूरी मानवता पर संकट के बादल गहरा रहे हैं। कहा नहीं जा सकता कि दिनोंदिन जहरीले होते वायुमंडल से प्राणियों का अस्तित्व कब विलीन हो जाए और सारी पृथ्वी अपनी ही संतानों द्वारा उपजाई गई विभीषिका से कान्तिहीन होकर जार-जार रोती रहे। विकसित देश संसाधनों से परिपूर्ण होने के कारण पर्यावरण के प्रति ज्यादा सचेत है इसीलिए वहां पर्यावरण संरक्षण के निरंतर सार्थक उपाय किये जा रहे हैं। किंतु विकासशील देश दोहरी समस्याओं का सामना कर रहे हैं। एक तो उन्हें विकास भी करना है और दूसरा उन्हें अपने पर्यावरण को भी बचाना है। दोनों काम एक साथ करते हैं, तो उन्हें संसाधनों के अभाव का सामना करना पड़ता है। नतीजा यह होता है कि उन्हें दो में से किसी एक की बलि चढ़ानी पड़ती है। तात्पर्य यह है कि या तो वे विकास की ओर बढ़े या वे अपने पर्यावरण को उसके हाल पर छोड़ दें। जबकि आवश्यक यह है कि विकास के लिए पर्यावरण से छेड़छाड़ करना जरूरी ही हो तो पर्यावरण पुनः संतुलित करने के लिए वैकल्पिक एवं वैज्ञानिक उपाय भी साथ-साथ होने चाहिए। लेकिन विकासशील देशों में यह तस्वीर नहीं दिख रही है।

मुख्य शब्द:

पर्यावरण, पर्यावरण संरक्षण, ग्लोबल वार्मिंग, जैव विविधता

प्रस्तावना

पर्यावरण संरक्षण के अध्ययन से पूर्व हमें पर्यावरण के बारे में मूलभूत जानकारी से अवगत होना उचित होगा। पर्यावरण शब्द दो शब्दों से मिलकर बना है। पहला शब्द परि जो हमारे चारों ओर है एवम दूसरा शब्द आवरण "आवरण"-जो हमें चारों ओर से घेरे हुए है। दूसरे शब्दों में यदि कहा जाए तो पर्यावरण मनुष्य के आसपास का वह भौतिक परिवेश है जिसका मनुष्य एक भाग है और वह अपने जैविक कार्यकलापों, भरण-पोषण और विकास के

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लिए उस पर निर्भर है। भौतिक पर्यावरण के अंतर्गत वायु, जल और भूमि जैसे प्राकृतिक संसाधनों से लेकर ऊर्जा वाहक, मृदा और पेड़-पौधे, पशु और पारिस्थितिकी तंत्र आदि जैसे तत्व शामिल हैं। भौतिक पर्यावरण मनुष्य और समाज के कल्याण के बीच बहुआयामी संबंध है।

पर्यावरण संरक्षण का अर्थ पर्यावरण संरक्षण का अर्थ पर्यावरण की गुणवत्ता में सुधार करना, उसकी रक्षा करना और उसे बनाए रखना है। पर्यावरण संरक्षण व्यक्तियों, समूहों और सरकारों द्वारा प्राकृतिक पर्यावरण की रक्षा करने की प्रथा है। इसका उद्देश्य

प्राकृतिक संसाधनों और मौजूदा प्राकृतिक पर्यावरण का संरक्षण करना है।

पर्यावरण संरक्षण के क्षेत्र पर्यावरण संरक्षण के प्रमुख क्षेत्र निम्नलिखित हैं :

- (i) पर्यावरण प्रदूषण और प्राकृतिक संसाधनों के उपयोग तथा विकास पर नियंत्रण।
- (ii) भूमंडलीय तापन और जलवायु परिवर्तन से संबंधित मुद्दों पर ध्यान देना जैसे ग्लोबल वार्मिंग आदि।
- (iii) अतिविषम घटनाओं यानी प्राकृतिक खतरों और आपदाओं का प्रबंधन।
- (iv) पर्यावरण इंजीनियरिंग के क्षेत्र में विकास।
- (v) पारिस्थितिकी तंत्र प्रबंधन और आवास संरक्षण आदि।

पर्यावरण संरक्षण का महत्व

सुप्रीम कोर्ट द्वारा 2021 में नियुक्त समिति ने भारत में पहली बार पेड़ों के मूल्यांकन पर दिशानिर्देश जारी किए हैं। विशेषज्ञों की पांच सदस्यीय समिति ने कहा कि एक पेड़ की कीमत उसकी उम्र 74,500 रुपये से गुणा की जाती है और 100 साल से अधिक की उम्र वाले एक विरासत पेड़ का मूल्य 1 करोड़ रुपये से अधिक हो सकती है। इस लागत के पीछे भोजन, औषधीय संपत्ति, पक्षियों और जानवरों के लिए आश्रय, ऑक्सीजन, प्रदूषण को नियंत्रित करना, ग्लोबल वार्मिंग को कम करना, सूखा रोकना, मिट्टी के कटाव को रोकना, बारिश, ठंडी हवा एवम अन्य लाभ आदि प्रमुख कारण हैं। इस प्रकार हम बनो का महत्व समझ सकते हैं।

पर्यावरण संरक्षण के महत्व को निम्न बिंदुओं द्वारा भी समझा जा सकता है:-

1. पर्यावरण संरक्षण से वायु, जल और भूमि प्रदूषण कम होता है।

2. जैव विविधता की सुरक्षा सुनिश्चित करने के लिए पर्यावरण संरक्षण का बहुत महत्व है।
3. सभी के सतत विकास के लिए पर्यावरण संरक्षण महत्वपूर्ण है।
4. हमारे ग्रह को ग्लोबल वार्मिंग जैसे हानिकारक प्रभावों से बचाने के लिए पर्यावरण संरक्षण भी महत्वपूर्ण है।

पर्यावरण संरक्षण अधिनियम 1986

पर्यावरण संरक्षण अधिनियम वर्ष 1986 में अधिनियमित किया गया था। इसे पर्यावरण की सुरक्षा और सुधार प्रदान करने और उससे जुड़े मामलों के मुख्य उद्देश्य के साथ अधिनियमित किया गया था। भारत के मूल संविधान में प्राकृतिक पर्यावरण की सुरक्षा के लिए कोई प्रावधान नहीं था। हालाँकि, संविधान में 42वें संशोधन द्वारा जोड़े गए मौलिक कर्तव्यों में जंगलों, झीलों, नदियों और वन्यजीवों सहित पर्यावरण की सुरक्षा को देश के नागरिकों के कर्तव्य के रूप में निर्धारित किया गया है। ईपीए के अधिनियमन की जड़ें जून, 1972 में स्टॉकहोम में मानव पर्यावरण पर आयोजित संयुक्त राष्ट्र सम्मेलन (स्टॉकहोम सम्मेलन) में निहित हैं, जिसमें भारत ने मानव पर्यावरण के सुधार के लिए उचित कदम उठाने के लिए भाग लिया था। यह अधिनियम स्टॉकहोम सम्मेलन में लिए गए निर्णयों को लागू करता है।

पर्यावरण संरक्षण और कानूनी प्रावधान

संविधान के अनुच्छेद 48-ए में कहा गया है कि राज्य पर्यावरण की रक्षा, सुधार करने, देश के जंगलों और वन्य जीवन की रक्षा करने का प्रयास करेगा। स्टॉकहोम सम्मेलन के बाद भारत ने कई अधिनियम लागू किए :

1. वन्यजीव अधिनियम 1972
2. जल अधिनियम 1974
3. वायु अधिनियम 1981

स्टॉकहोम घोषणा के पांच वर्षों के भीतर, पर्यावरण के संरक्षण और सुधार को संवैधानिक जनादेश के रूप में शामिल करने के लिए भारत के संविधान में संशोधन किया गया। समय-समय पर पर्यावरण की सुरक्षा और सुधार अब संविधान अधिनियम 1976 के तहत एक मौलिक कर्तव्य है। भारत सरकार ने पर्यावरण योजना और समन्वय पर एक राष्ट्रीय समिति की स्थापना की है।

पर्यावरण के लिए भारत सरकार के कार्यक्रम में गंगा और यमुना सहित नदियों की सफाई का कार्यक्रम शामिल था। प्रधान मंत्री, राजीव गांधी ने गंगा के प्रदूषण नियंत्रण के उद्देश्य से केंद्रीय गंगा प्राधिकरण का गठन किया। पर्यावरण संरक्षण अधिनियम, 1986 का अधिनियमन इस कार्यक्रम का तत्काल परिणाम था।

पर्यावरण संरक्षण अधिनियम संशोधन

मंत्रालय ने साधारण उल्लंघनों के लिए कारावास के खतरे को दूर करने के लिए ईपीए, 1986 के मौजूदा प्रावधानों को अपराधमुक्त करने का प्रस्ताव दिया है। इसमें "कम गंभीर" अपराधों के लिए सजा के रूप में जेल की सजा को हटाना शामिल है। हालाँकि ईपीए के गंभीर उल्लंघन जो गंभीर क्षति या जीवन की हानि का कारण बनते हैं, उन्हें भारतीय दंड संहिता के प्रावधान के तहत कवर किया जाएगा।

पर्यावरण संरक्षण के प्रकार पर्यावरण संरक्षण चार प्रकार का होता है, जो इस प्रकार है : जलसंरक्षण, वन संरक्षण, वन्य जीव संरक्षण, जैव विविधता।

1. जल संरक्षण-

जल संरक्षण अनावश्यक जल उपयोग को कम करने के लिए जल का सही तरीके से उपयोग करने की प्रथा है। फ्रेश वॉटर वॉच के अनुसार, जल संरक्षण महत्वपूर्ण है क्योंकि ताजा स्वच्छ पानी एक सीमित संसाधन है। पानी हमारे दैनिक जीवन के लिए आवश्यक है। जब भी पानी का उपयोग किया जाता है, तो आपके घर या

व्यवसाय के अंदर और बाहर दोनों जगह संरक्षण की संभावना होती है। ताजा पानी एक सीमित संसाधन है, जो जल संरक्षण को पर्यावरण के लिए एक महत्वपूर्ण कारक बनाता है। जनसंख्या वृद्धि, उद्योग के विस्तार, विकास गतिविधि के बढ़ते स्तर और जलवायु परिवर्तन के प्रभावों की संभावना के कारण प्रांत के जल संसाधनों पर दबाव बढ़ रहा है। चाहे आप नगरपालिका या निजी घरेलू जल आपूर्ति पर हों, जल संरक्षण एक बुद्धिमान अभ्यास है।

2. वन संरक्षण-

वन संरक्षण, वन क्षेत्रों में रोपण और रखरखाव करने की प्रथा है। वन संरक्षण का उद्देश्य पेड़ों की प्रजातियों की संरचना और आयु वितरण में त्वरित बदलाव भी है। वन मानव जीवन के लिए महत्वपूर्ण हैं, क्योंकि वे विभिन्न प्रकार के संसाधन प्रदान करते हैं जैसे वे कार्बन का भंडारण करते हैं और कार्बन सिंक के रूप में कार्य करते हैं। ऑक्सीजन का उत्पादन करते हैं, जो पृथ्वी पर जीवन के अस्तित्व के लिए महत्वपूर्ण है, इसलिए इन्हे सही मायने में पृथ्वी का फेफड़ा कहा जाता है। जल विज्ञान चक्र को विनियमित करने में मदद करते हैं। ग्रहीय जलवायु, पानी को शुद्ध करना, वन्य जीवन आवास प्रदान करना, ग्लोबल वार्मिंग को कम करना, प्रदूषण को कम करना, मिट्टी का संरक्षण करना, बाढ़ और भूस्खलन जैसे प्राकृतिक खतरों को कम करना आदि।

3. वन्य जीव संरक्षण-

वन्य जीव संरक्षण, स्वस्थ वन्यजीव प्रजातियों या आबादी को बनाए रखने, प्राकृतिक पारिस्थितिक तंत्र को बहाल करने, संरक्षित करने या बढ़ाने के लिए जंगली प्रजातियों और उनके आवासों की रक्षा करने की प्रथा से है। वन्य जीव संरक्षण की स्थापना के निम्नलिखित कारण हैं :

1. जानवरों को हमेशा उनके प्राकृतिक आवास से स्थानांतरित करना काफी कठिन होता है, इसलिए उन्हें

उनके प्राकृतिक वातावरण में संरक्षित करना फायदेमंद होता है।

2. वन्य जीव संरक्षण में जीवविज्ञानी गतिविधियों और शोधों की अनुमति है, ताकि वे वहां रहने वाले जानवरों के बारे में जान सकें।

4. जैव विविधता-

जैव विविधता का मतलब वर्तमान और भविष्य की पीढ़ियों के लिए स्थायी लाभ प्राप्त करने के लिए जैव विविधता की सुरक्षा, उत्थान और प्रबंधन से है। संसाधनों के सतत विकास को प्राप्त करने में जैव विविधता के संरक्षण और प्रबंधन को जैव विविधता कहा जाता है।

जैव विविधता के तीन प्रमुख उद्देश्य हैं:

1. प्रजातियों की विविधता का संरक्षण
2. प्रजातियों और पारिस्थितिकी तंत्र की स्थिरता।
3. जीवन-समर्थक और आवश्यक पारिस्थितिक प्रक्रियाओं को बनाए रखना।

प्रकृति ने पृथ्वी पर जीव की उत्पत्ति से लेकर जैव विविधताओं की एक व्यापक श्रृंखला तैयार की है एवं जैव विकास का एक अदभुत इतिहास रचा है। भारत की गणना विश्व के 12 विशाल जैविक विविधता वाले देशों में होती है। प्रकृति ने हमें लगभग 46000 वनस्पति प्रजातियों एवं 31000 के करीब जैव प्रजातियों की सम्पन्नता से हमें नवाजा है। किंतु अपनी स्वार्थ सिद्धि के लिए मानव न जाने कितने वन्य जीवों का बड़ी निर्ममता से वध करता आ रहा है। पृथ्वी पर मानव के बढ़ते एकछत्र राज्य की प्रवृत्ति के कारण जैव विविधताओं का संसार अब सिमटना जा रहा है तथा अनेक जीव दुर्लभ होते जा रहे हैं। सिमटते प्राकृतिक परिवेश, अवैध शिकार, तीव्र औद्योगिकीकरण खाल, मांस, हड्डी, दांत आदि की अंतर्राष्ट्रीय तस्करी के कारण वन्य प्राणियों के समक्ष अस्तित्व का खतरा उत्पन्न हो गया है।

लुप्तप्राय वन्य जीवन

भारत के वन्य जीवन की विविधता बहुत कम देशों में ही दृष्टिगोचर होती है। यहां स्तनधारी जंतुओं की 350 प्रजातियां पाई जाती हैं। दो हजार किस्म के पक्षी लगभग 7 सौ किस्मों के रेंगने वाले सरीसृप वर्ग के जीव एवं करीब बीस हजार से भी अधिक प्रकार के भाँति-भाँति के कीट पतंग भारतीय वन जीवन की अमूल्य सम्पदा हैं। प्राकृतिक असंतुलन ने केवल स्तनपायी वर्ग के ही 350 में से 81 प्रजातियों को लुप्तप्राय कर दिया है।

अद्भुत क्षमता व असाधारण शक्ति वाले बिल्ली परिवार की सभी प्रजातियां पर लुप्त होने का खतरा मंडरा रहा है। बिल्लियों के वर्ग के प्रमुख भारतीय सिंह (अँधेरा लियो पर्सिया), बाघ (पँधेरा टाइग्रिस) एवं तेंदुआ (पँधेरा पारडस) जो खाड़ी देशों से लेकर भारत एवं म्यांमार तक फैले हुए थे आज मात्र गिरनार (गुजरात) के क्षेत्रों तक सीमित हो चुके हैं। बाघ की आठ एशियाई उप-प्रजातियों में से केवल भारतीय बाघ ही बने हैं। वाली, जावा आदि मलय प्रजाति एवं कैस्पियन, साइबेरियन, सुमात्रन तथा चीनी बाघों की पूरी प्रजाति ही समाप्त हो चुकी है। अति तेज गति के लिए प्रसिद्ध चीता अन्तिम बार 1952 में तमिलनाडु के तियूर के जंगलों में देखा गया था। तेंदुआ या गुलदार भारत के जंगलों में बहुतायत से पाया जाने वाला प्राणी है। तेंदुए की खाल के लोभियों ने पर्वतीय क्षेत्रों में 4000 मीटर की ऊंचाई पर पाए जाने वाले हिम तेंदुओं (स्नो लेपर्ड) को भी नहीं बख्शा है। स्थानीय भाषा में जिन्हें 'शान' कहा जाता है ये सफेद धब्बेदार हिम तेंदुओं की संख्या भी 200 के आसपास रह गई है।

असम, बंगाल के सुन्दरवन एवं उड़ीसा के चिल्का क्षेत्र में पाई जाने वाली भारतीय बिल्ली अपने सुन्दर फर के कारण मारी जाती है। दूसरी सर्वाधिक संकट ग्रस्त मृग प्रजाति के जीव जिसमें बारहसिंगा हिरणों की विशेष प्रजाति स्वैप डियर भारत, पाकिस्तान, नेपाल एवं थाईलैंड में पाई जाती थी। यह पाकिस्तान एवं थाईलैंड से तो विलुप्त हो चुकी है भारत एवं नेपाल में भी

खतरे में है। इस परिवार का कस्तूरी मृग (मस्क डियर) अपनी सुगंधित कस्तूरी की वजह मारी जाता है। एवम परिवेश के बेरहमी से दोहन ही वन जीवन के नष्ट होने की ओर कदम बढ़ा रहा है। पक्षियों में भारतीय गिद्ध पूरी तरह विलुप्तप्राय हो चुके हैं। भारतीय उपमहाद्वीप के गिद्धों पर पहली बार बड़े पैमाने पर कीटनाशकों का विनाशकारी प्रभाव प्रत्यक्ष देखा जा रहा है। कीटनाशकों के प्रभाव से इनके अंडों के छिलके कमजोर होते हैं जो सेने के समय ही टूट जाते हैं। यही कारण है कि गिद्धों की वंशवृद्धि रुक सी गई है। पर्यावरण के सफाई कर्मी माने जाने वाले इन पक्षियों की स्थिति वास्तव में चिन्ताजनक है। भारत का राष्ट्रीय पक्षी मोर अपने पंखों के कारण मारा जाता है तो हरियल जैसे पक्षी मांसों के कारण।

महा सागरीय जीव जंतुओं के अस्तित्व पर खतरा

पहले नदियां, घरेलू कचरे और मल-मूत्र को आसानी से पचा लेती थी और स्वयं शुद्ध और साफ रख पाती थीं परंतु इनकी मात्रा में अत्यधिक वृद्धि हो जाने तथा इनमें कारखानों के विषैले बहिष्वाव तथा खेतों में छिड़के जाने वाले पीड़कनाशी और कीटनाशी तथा सीसा, पारा, कैडमियम, आर्सेनिक, जस्ता आदि धातुओं के मिल जाने के कारण नदियां इन्हें पचा नहीं पातीं और अंततः इन्हें सागर में फेंक देती हैं। इससे महासागर दिन-प्रतिदिन गंदे होते जा रहे हैं। ऐसी गंदगी और विषैले पदार्थों के साथ सागर को पेट्रोलियम और रेडियोधर्मी व्यर्थ पदार्थ भी पर्याप्त मात्रा में मिलते रहते हैं। ये सागर को अत्यधिक प्रदूषित कर रहे हैं जिससे न केवल समुद्री जीव-जंतुओं की स्थायी हानि हो रही है वरन् उनका भक्षण करने वाले मनुष्य भी अनेक असाध्य बीमारियों के शिकार होते रहते हैं और असमय बड़ी संख्या में उनकी मृत्यु होती रहती है। पिछले दो-तीन दशकों के दौरान विविध कारकों के फलस्वरूप न केवल प्रदूषकों की मात्रा बहुत बढ़ गई है वरन् उनकी विविधता और घातकता में भी अत्यधिक वृद्धि हुई है। महासागरों में 40% प्रदूषक नदियों आदि द्वारा बहाकर लाने, 30% सीधे फेंके जाने, 15%

सागर में माल (पेट्रोलियम) परिवहन, 13% प्रदूषक वायु के साथ उड़कर सागर में पहुंचते हैं तथा 2 % सागर से खनिज तेल निकालते समय उनमें मिलते हैं। ये महासागरीय प्रदूषण के प्रमुख कारण हैं।

पर्यावरण संरक्षण की दिशा में हमारे नैतिक दायित्व

पर्यावरण की रक्षा करना केवल एक जिम्मेदारी नहीं है, यह एक मौलिक कर्तव्य भी है, हम सभी में बदलाव लाने की शक्ति है और सरल कदम उठाकर हम अपने ग्रह की रक्षा कर सकते हैं और अपने बच्चों के लिए एक उज्ज्वल भविष्य सुनिश्चित कर सकते हैं।

कुछ निम्नलिखित चरण छोटे एवम सरल हैं, किंतु है बहुत प्रभावी -

1. पेट्रोल डीजल की खपत रोकने एवम उससे होने वाले प्रदूषण को रोकने व्यक्तिगत कार की बजाय सार्वजनिक परिवहन का उपयोग करें। पैदल चले, साइकिल चलाए।
2. एक पेड़ लगाएं और उसकी देखभाल करें।
3. कम से कम एक प्राकृतिक उत्पाद का उपयोग करें।
4. बिजली बचाएं और ऊर्जा- कुशल प्रकाश व्यवस्था का उपयोग करें।
5. जीव जंतुओं की हत्या रोकने हेतु मांस का सेवन कम करें।
6. समुद्री एवम जीव जंतुओं की जान बचाने हेतु सिंगल-यूज प्लास्टिक से बचें।
7. अपने बच्चों को पर्यावरण के बारे में शिक्षित करें।
8. वनों की कटाई रोकी जानी चाहिए।
9. पराली ना जलाएं, कम से कम रासायनिक खादों का उपयोग करें, जैविक खेती को बढ़ावा दे
10. महा सागर में तेल रिसाव को रोकने के लिए सूक्ष्म तरंगों का उपयोग किया जाए। तेल भक्षक जीवाणु की प्रजाति स्फ्यूडोमोनास के उपयोग से।

11. नदियों द्वारा समुद्रों में लाया गया गाद प्रदूषण का बड़ा कारण है। उसका मुख्य कारण होता है, भूमि कटाव जिसे वन संरक्षण द्वारा रोका जा सकता है।
12. घरेलू और औद्योगिक कचरे को पुनः उपयोग पर बल देने की जरूरत है। जापान तथा अन्य विकसित देशों में इस कार्य को किया जा रहा है।

पर्यावरण संरक्षण की दिशा में बढ़ते कदम

पर्यावरण एवं वन्य प्राणियों के संरक्षण हेतु भारत में सर्वप्रथम राष्ट्रीय उद्यानों का सफर 1935 में हेली नेशनल पार्क की स्थापना से हुआ। हिमालय की तराई में स्थित यह जिम कार्बेट राष्ट्रीय उद्यान के नाम से जाना जाता है। स्वतंत्र भारत में वन्य जीवन के संरक्षण हेतु 1952 में 'केंद्रीय सलाहकार समिति का गठन हुआ जिसे 'इंडियन बोर्ड ऑफ वाइल्ड लाइफ' की संज्ञा दी गई। इसके अध्यक्ष स्वयं प्रधानमंत्री होते हैं तथा प्रकृति विशेषज्ञों तथा पर्यावरणविदों को इसका सदस्य बनाया जाता है। 1972 में 'केंद्रीय वन्य जीवन रक्षा अधिनियम' बनाया गया जो वर्तमान में संपूर्ण देश में लागू है। इस अधिनियम में ऐसे 11 प्राणियों का उल्लेख किया गया, जो प्राकृतिक असंतुलन के कारण विलुप्त होने की स्थिति में थे।

भारत में इसी जागरूकता के कारण वन्य जीवन सुरक्षा के लिए राष्ट्रीय उद्यान एवम अभ्यारण्यों का निर्माण किया गया है। 1975 तक देश में मात्र पांच राष्ट्रीय उद्यान थे। जो आज लगभग 186 तथा अभ्यारण्यों की संख्या लगभग 480 पर पहुंच गए हैं। सभी राष्ट्रीय उद्यानों के विकास और उन्नत प्रबंध, वन्य जीवों के संरक्षण और गैर-कानूनी तरीके से जीवों के शिकार एवं वन्य जीवन उत्पादों के अवैध व्यापार पर प्रतिबंध लागू है।

निष्कर्ष - मनुष्य अपने जीवन एवं सुख-साधनों की वृद्धि हेतु जिन प्राकृतिक संसाधनों का उपयोग करता है, वे सब पर्यावरण के महत्वपूर्ण घटक हैं। भूमि, जल, वायु, खनिज, वन्यजीव एवं

वनस्पतियां, ऊर्जा तथा ताप एवं समस्त जैव एवं अजैव तत्व मिलकर पर्यावरण का निर्माण करते हैं। विकसित देशों ने इन तत्वों को चरम सीमा तक प्रयोग किया है, जबकि प्राकृतिक संसाधनों की प्रचुरता वाले कतिपय अल्पविकसित देशों ने अपने पर्यावरणीय संसाधनों का एक अंश ही विदोहन है। उल्लेखनीय है कि विश्व के देशों में कतिपय प्राकृतिक संसाधनों का वितरण भी समान नहीं है। किसी देश में खनिजों के विपुल भण्डार हैं, तो कहीं जल संसाधन की प्रचुरता है। इन संसाधनों के बल पर ही इन देशों ने पर्याप्त प्रगति की है। जापान के 70 प्रतिशत वन तथा कनाडा के 46 प्रतिशत वन क्षेत्र ने इन देशों को समृद्ध बनाने में महत्वपूर्ण भूमिका निभाई है। अरब देशों में उपलब्ध खनिज तेलों के विपुल भण्डार ने इन देशों का धनवान राष्ट्रों की श्रेणी खड़ा कर दिया है। इसी तरह दक्षिणी अमेरिका की अमेजन नदी तथा अफ्रीका की नील नदी ने अपने किनारे बसने वाले लोगों का समृद्धशाली बनाया है। विभिन्न देशों को समृद्धशाली बनाने वाले प्रकृति के निःशुल्क उपहार इन प्राकृतिक संसाधनों को इस तरह उपयोग किए जाने की आवश्यकता है, ताकि पर्यावरण का संतुलन बना रहे तथा इसमें क्षरण अथवा विघटन की समस्या उत्पन्न ना हों। इस दृष्टि से पर्यावरण के विभिन्न अवयवों जैविक एवं अजैविक तत्वों की संरक्षा, सुरक्षा एवं संरक्षण की आवश्यकता है।

संदर्भ स्रोत

1. पर्यावरण संरक्षण में विधायिका की भूमिका, लेख श्रीमती लता श्रीवास्तव महासचिव लोकसभा सचिवालय
2. पर्यावरण संरक्षण में विधायिका की भूमिका लेख ए पी श्रीवास्तव प्रमुख सचिव मध्य प्रदेश विधानसभा
3. विलुप्तप्राय प्रजातियां भाग 1 लेख सिविल सर्विसेज क्रॉनिकल पत्रिका जुलाई 2004
4. महासागरीय प्रदूषण लेख सिविल सर्विसेज क्रॉनिकल पत्रिका दिसंबर 2005
5. पर्यावरण संरक्षण और प्रबंधन इकाई 6 लेख गूगल सर्च

6. पर्यावरण संरक्षण मीडिया की भूमिका, लेख केशव पटेल
7. पर्यावरण संरक्षण जागरूकता में प्रिंट मीडिया की भूमिका लेख शिवकुमार, डॉ हरीश कुमार



Analysing Balanced Scorecard's Influence on Healthcare Sustainability of Haryana

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Abstract:

The constant and quick changes in the healthcare industry have made performance reviews a vital tool for managers in the field. Achieving sustainable performance management entails boosting an organization's efficacy and efficiency while taking into account all sustainability factors. This study looks at how strategic HRM enhancements, accounting information systems, and digital transformation affect the performance of organizations and sustainable development. The performance of the company is assessed in this study using the balanced scorecard (BSC). The study puts out a theoretical framework for sustainable organizational growth that combines human resources involvement with traditional and digital information technologies. In an empirical study, a questionnaire is used to poll 209 healthcare sector workers in order to evaluate the theoretical model. The research findings, which were based on structural equation modelling, demonstrated that BSC dimensions are substantially favourably impacted by the efficacy and effectiveness of the AIS and the strategic management of human resources. Furthermore, with internal process dimension having the greatest influence, using BSC to measure organizational performance has a substantial impact on sustainable growth.

Keywords:

Balanced Scorecard (BSC), Digital Transformation (DT), Accounting Information System (AIS), Strategic Human Resource Management (SHRM), Sustainable Development (SD).

Introduction:

Many healthcare companies are choosing to employ performance evaluation methods that include all performance parameters as a result of the movement toward sustainable development. Patients and other stakeholders are particularly concerned with assessing sustainable performance since value is created in the knowledge- and

digital-based economy mostly through intangible assets, which are very challenging to assess. Up to the 1990s, organizations used methods for performance evaluation that exclusively took financial accounting data and financial criteria into consideration. Intangible assets, or intellectual property, generate higher added value and significantly increase competitive advantage as they are

immeasurable in monetary terms. Intangible assets include human resources' skills and expertise, AIS' features, and the leading edge of digital technology used in business operations. The primary advantage of intangible assets is their difficulty for competitors to copy. The main disadvantage is that evaluating the performance of intangible assets is difficult. Conventional approaches, which were focused on financial metrics, did not offer data that could be used to solve issues or take advantage of opportunities pertaining to clients, product quality, and the workforce. Consequently, there were differing views in performance reviews on the necessity of using non-financial criteria to quantify intangible assets.

Businesses have embraced the use of diverse performance evaluation techniques that are in line with their strategic goals. Organizations use a variety of performance assessment approaches that are suited to the makeup and diversity of their assets in order to assess real performance in response to this transformation. With an emphasis on evaluating intangible assets like intellectual capital, organizations have been using a variety of multidimensional performance evaluation approaches since the 1990s, including the BSC, Skandia Navigator, Prism of Performance, pyramid of performance, and Measurement Model of Performance Matrix.

Palozzi et al. established the Health Technology Balanced Assessment Framework, which blends the Balanced Scorecard with Health Technology Assessment (HTA), to enhance the management of health technology in hospital settings and promote strategic coordination. However, the lack of a clear instrumental framework makes it difficult to use BSC and HTA simultaneously. The research proposes a model that investigates

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the relationships between BSC components, AIS, DT, and SHRM. It also offers the tools required to integrate BSC and HTA. By providing an experimentally confirmed theoretical model, the study fills a vacuum in the healthcare literature and provides a crucial basis for improving the Balanced Scorecard. Thus, the purpose of this research is to examine how various aspects of organizational BSC performance are affected by DT, advancements in AIS, and SHRM, as well as the unintended consequences these factors may have on the long-term viability of healthcare institutions. The research strengthens the significance of the Balanced Scorecard in fostering SD by examining these causal links, with DT, improvements to the AIS, and optimization of SHRM acting as important input elements.

The results give hospital management the means to achieve sustainable growth by involving human resources in strategic processes and transforming digital and informational environments.

Review Of Literature:

Using BSC for Performance Assessment

The impact of production factors on organizational success is measured through performance evaluation. Enhancing performance in comparison to prior periods and similar organizations is the primary goal of performance reviews. Furthermore, research on the psychological effects of performance evaluation has highlighted the value of transformative criticism in promoting performance enhancement, with a focus on enhancing organizational capacities.

The Balanced Scorecard (BSC), according to Kaplan and Norton, is a managerial method that makes it easier for a company

to implement its strategy. The BSC turns an organization's vision and strategy into a measurable representation by transforming performance indicators from a SHRM. This tool helps define strategic objectives more precisely and makes plan implementation easier.

Both financial and non-financial measures are balanced by the Balanced Scorecard, which covers elements like customers, internal business processes, and learning and organizational development practices. The BSC takes a balanced approach since it takes into account both financial and non-financial aspects. Organizational operations with strategic objectives are aided by BSC dimensions.

BSC is essential to strategy formulation and execution as well as organizational goal assessment because of its strategic performance evaluation capabilities. Researchers over the past 20 years have examined how top businesses in a variety of industries, such as the public or healthcare sectors, have used BSC.

Digital Transformation

Because digital innovations and technology increase accessibility, speed, transparency, innovativeness, and trust, they have a substantial influence on organizational performance in healthcare companies. By accelerating decision-making and decreasing mistakes, the degree of digital technology adoption determines the extent of digital transformation (DT) in operations. This significantly affects how decisions are made.

In DT, new digital technologies are integrated into a business model, organizational procedures are enhanced, the value creation chain is redesigned, and customer requirements are more effectively

met. The successful execution of digital transformations requires more than just formulating a plan in the DT area, since the strategic integration and deployment of digital technology is a more comprehensive notion. The effectiveness of DT, however, depends on how well it integrates into organizational procedures and how well people adopt these technologies, since it is an organizational transformation rather than just a change in digital technology. Consequently, DT initiatives need to be related to AIS and coordinated with SHRM in order for them to fully fit into an organization's strategy. The BSC model seeks to do away with unnecessary tasks and close the gap between strategy and execution. Consequently, employing BSC would assist in putting a plan into practice in the field of DT. DT has a good impact on BSC dimensions, especially FD.

Accounting Information System

A healthcare facility's accounting information system (AIS) gathers, organizes, and generates financial and operational data. Accounting, financial, and managerial approaches are integrated with the capabilities of organizational information management software through AIS. Improved quality, quantity, and speed of information dissemination; increased adaptability to a constantly shifting economic environment; improved operational management; communication channel optimization; and more opportunities for external relationship building are just a few benefits that come from efficient and effective AIS. Organizations are presented with greater options for diversification due to their increased informational capabilities. **Ditkaew** asserts that AIS quality has a major impact on company success.

Verboncu and Zalman demonstrate how BSC aspects may be measured using performance metrics for organizational efficacy and efficiency. As a result, accountable accounting information systems ought to gauge performance across the board rather than just financially. As a result, over time, firms' accounting information systems might advance to assess non-financial performance, promoting the long-term viability of the enterprise.

Strategic Human Resources Management

In the modern economy, human capital—which is especially important for healthcare organizations—represents intellectual capital made up of abilities, skills, and knowledge that may give a company a competitive edge.

SHRM primarily impacts two areas: the learning and development component within the BSC and the internal process dimension of an organization's organizational performance. Findikli et al. and Amer et al. provide examples of how SHRM may improve employee engagement and performance. Furthermore, the implementation of human resource strategies has a noteworthy and beneficial effect on the performance of a firm, influencing both its financial outcomes and customer relations. According to Amer et al., including healthcare personnel in BSC implementation might address the issue of employee resistance toward digital transformation and raise satisfaction levels. Amer et al. also discover that all BSC aspects will be improved when health professionals are involved in BSC implementation.

Impact of BSC on Sustainable Development

Every company must achieve both financial and non-financial success in order to meet its sustainable development goals. The goals of SD must be included in the organizational transformation paradigm through digital transformation. Because it evaluates non-financial performance as a component of sustainable performance, the BSC is a helpful tool for improving businesses' sustainable performance. Organizational growth and sustainable development are facilitated by the BSC. According to recent research, sustainable development and the balanced scorecard are highly integrated. A driving force behind improving sustainable development with regard to social and environmental challenges is non-financial indicators. The development and success of an organization depend heavily on learning and growth. Adopting the BSC is essential to ensuring the organization's sustainable growth since it uses financial indicators to represent the economic drivers and operational indicators to reflect the social and environmental drivers. It is essential to synchronize strategic management and sustainable development systems for optimal use of BSC.

Objectives:

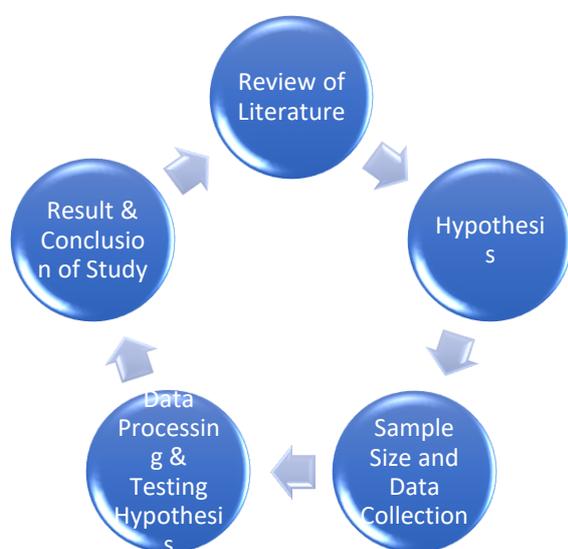
1. To evaluate how BSC Dimensions are affected by Digital Transformation.
2. To examine the influence of Accounting information system upgrade on BSC.
3. To look into how BSC is affected by strategic human resource management.
4. To evaluate the contribution of BSC aspects to Sustainable Development.

Hypothesis:

1. **H1:** It states that DT significantly improves BSC dimensions.
2. **H2:** The BSC dimensions are significantly improved by the AIS upgrade.
3. **H3:** The BSC dimensions are strongly positively impacted by the SHRM improvement.
4. **H4:** Sustainable development is significantly improved by BSC aspects.

Research Methodology And Designing:

Five rounds of research were conducted to determine how personnel with management experience in the healthcare industry saw sustainable development, the direct effects of DT, AIS, SHRM, SD on BSC dimensions.



The study's method of evaluating "employees' perception of management experience in the healthcare sector" was a survey based questionnaire. The stratified random sample approach was employed in the investigation. Gender and age were the two demographic factors that determined

the layers' creation. The research population was made up of healthcare workers with prior managerial experience in the industry. The state of Haryana hosted the survey. Among the responders were staff members with backgrounds in doctors, nursing, and middle and upper management. The sample has a 95% confidence level and a 4.55% margin of error. The survey was emailed to 300 people in order to provide a sufficient sample size with a high level of confidence and a small margin of error. Out of the 300 participants, 209 returned the surveys filled out. Consequently, 209 correctly filled questionnaires are valid. Men make up 53.6% of the total responses, while women make up 46.4%. The age-based hierarchy looks like this: 10.5% of respondents are in the 18–24 age range, 68.4% are in the 25–35 age range, 14.4% are in the 35–44 age range, and 6.7% are above 45.

There are twenty-five questions in the questionnaire. Previous research on BSC dimensions, DT, AIS, SHRM, and SD served as the basis for the construction of the questionnaire items. The first section of the questionnaire had five questions that asked about demographics. The antecedent factors of digital transformation, sustainable development, BSC dimensions, AIS enhancement, and SHRM are covered in the sections that follow.

Table: 1 Questionnaire Design (own construction Google Form)

Variables	Item	Scale
Demographic Variable	Age	According to age with 5 different categories, Gender (Male & Female), Positions in
	Gender	
	Position	
	Experience	

	Education	healthcare industry like Dr., nurse, admin staff etc., experience and level of education
DT	Digital Transformation	Very Low to High : 1 to 5
	Financial (Dt)	
	Customer (Dt)	
	Internalprocess (Dt)	
	Learning And Growth (Dt)	
AIS	Accounting Information System	
	Customer (Ais)	
	Internal Process (Ais)	
	Learning And Growth (Ais)	
SHRM	Sustainable Human Resource Management	
	Talent Acquisition And Retention (Shrm)	
	Employee Wellness Program (Shrm)	
	Performance Management System (Shrm)	
	Diversity Inclusion And Initiatives (Shrm)	
SD	Financial Metrics (Sd)	
	Customer Satisfaction Metrics (Sd)	
	Internal Process Efficiency Metrics (Sd)	
	Learning And Growth Metrics (Sd)	
BSC SD	Overall Satisfaction	

The survey consists of broad inquiries on the opinions of the employees; it excludes information that needs informed consent and an institutional review board. The measuring scales were created using the results of earlier studies. Within the model, the endogenous (latent) variables are DT, AIS, SHRM, and SD. Table 2 shows the descriptive statistics of the observable variables (questionnaire items).

Table: 2 Descriptive Statistics (Source: own construction Ibm Spss Statistics)

Content	Minimum	Maximum	Mean	Standard Deviation	Kurtosis	Skewness
Age	1.00	4	2.188	0.698	1.36	0.985
Gender	1.00	2	1.464	0.499	-1.998	0.145
Position	1.00	5	2.598	1.05	-1.128	-0.262
Experience	1.00	5	2.679	1.057	-0.134	0.867
Education	1.00	5	2.718	0.934	-0.73	-0.33
Dt	1.00	5	4.44	0.829	1.54	-1.384
Fin (Dt)	1.00	5	4.431	0.921	1.789	-1.553
Cus (Dt)	1.00	5	4.44	0.901	2.185	-1.621
Ip (Dt)	1.00	5	4.493	0.87	2.354	-1.712
L & G (Dt)	1.00	5	4.522	0.819	2.552	-1.702
Ais	1.00	5	4.574	0.736	2.833	-1.748
Cust (Ais)	1.00	5	4.545	0.858	3.033	-1.905
Ip (Ais)	1.00	5	4.545	0.824	3.482	-1.931
L & G (Ais)	1.00	5	4.584	0.748	2.744	-1.778
Shrm	1.00	5	4.593	0.7	3.709	-1.854
Tar (Shrm)	1.00	5	4.589	0.838	2.618	-1.907
Ewp (Shrm)	1.00	5	4.512	0.902	3.058	-1.905
Pms (Shrm)	1.00	5	4.589	0.826	3.613	-2.03
Dii(Shrm)	1.00	5	4.603	0.77	2.971	-1.899
Fm (Sd)	1.00	5	4.541	0.875	2.268	-1.81
Csm (Sd)	1.00	5	4.474	0.886	2.88	-1.79
Ipem (Sd)	1.00	5	4.531	0.891	3.838	-2.034
Lgm (Sd)	1.00	5	4.56	0.829	3.523	-1.971

The central tendency, variability, and distribution features of the variables in Table 1 are shown by descriptive statistics. The age variable, in particular, shows a moderate level of variability with a mean of 2.188 and a deviation of standard of 0.698. Gender indicates less variability, with a mean of 1.464 and a comparatively low deviation of standard of 0.499. With a mean of 2.598, position has a wider range from 1 to 5, indicating variation in positions. Domain-specific variables, such as DT, FIN (DT), and CUS (DT), exhibit a steady trend toward the upper limit with high mean values around 4.44. The distribution shape may be understood by looking at the skewness and kurtosis values. For example, a leftward skew is suggested by a negative skewness in gender and a rightward skew in

age. All things considered, these statistics help with the dataset's interpretation by offering a succinct synopsis of each variable's salient features. The study tested research ideas through the use of structural equation modelling. By using structural equation modelling, one may evaluate the connections between the latent variables in the model.

Result:

The optimum method for evaluating the four hypotheses is to utilize the Smart PLS v4.0 software, which supports structural equation modelling. The PLS method is used with a reflective model. The model is subjected to bootstrapping technique for the path coefficient. As an example of the empirical model, see Fig. 3.

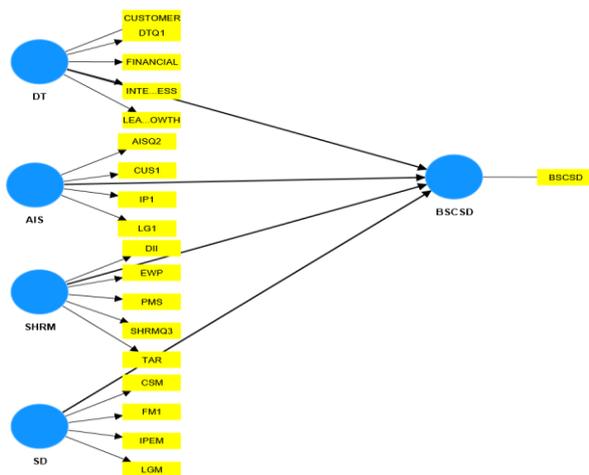


Fig: Model based on empirical data. Source: self-made using Smart PLS v4.0

With average variance extracted over 0.82, composite reliability over 0.92, and Cronbach's alpha above 0.95, Table 3 demonstrates the exceptional reliability and validity of the variables. Moreover, values over 0.9 (0.906) for the normalized fit index (NFI) and below 0.08 (0.075) for the standardized root mean squared residual (SRMR) indicate a solid fit for the model.

Table:3 Validity and Reliability (Source: self-made using Smart PLS v4.0)

	Cronbach's Alpha	Composite Reliability	Average
DT	0.953	0.958	0.845
AIS	0.949	0.949	8.868
SHRM	0.955	0.957	0.850
SD	0.961	0.962	0.895
BSC	0.900	0.929	0.770

The paper used a bootstrapping technique with 300 subsamples at a significance threshold of 0.05 to assess research hypotheses. Values larger than 2.5 for T statistics and less than 0.005 for p values suggest that the route coefficients are more significant. Route coefficients that show the direct positive impacts between the model variables are shown in Table 4.

Table:4 Path Coefficient (Source: self-made using Smart PLS v4.0)

ypothesis	Path	Original Sample (O)	T Statistic (O/Std ev)	P Values	Validation
H1	Data Transformation	0.190	14.273	0.000	Validated
	Financial (Dt)	0.224	27.322	0.000	
	Customer (Dt)	0.239	24.810	0.000	
	Internal process (Dt)	0.217	25.675	0.000	
	Learning And	0.216	24.210	0.000	

H2	Accounting Information System	0.286	18.804	0.000	Validated	Customer Satisfaction Metrics (Sd)	0.268	38.013	0.000
	Customer (Ais)	0.268	34.993	0.000		Internal Process Efficiency Metrics (Sd)	0.252	24.708	0.000
	Internal Process (Ais)	0.263	37.379	0.000		Learning And Growth Metrics (Sd)	0.263	39.041	0.000
	Learning And Growth (Ais)	0.259	38.284	0.000					
H3	Sustainable Human Resource Management	0.207	17.089	0.000	Validated				
	Talent Acquisition And Retention (Shrm)	0.209	24.382	0.000					
	Employee Wellness Program (Shrm)	0.218	29.902	0.000					
	Performance Management System (Shrm)	0.227	29.004	0.000					
	Diversity Inclusion And Initiatives (Shrm)	0.223	29.835	0.000					
H4	Financial Metrics (Sd)	0.274	31.516	0.000	Validated				

Table 4 demonstrates the validity of each of the four assumptions. The structural model's hypotheses are supported by Table 4. The following major data transformation impacts support hypothesis 1: internal process (DT) = 0.217, learning and growth (DT) = 0.216, finance (DT) = 0.224, and customer (DT) = 0.239. Positive accounting information system effects—customer (AIS) = 0.268, internal process (AIS) = 0.263, and learning and growth (AIS) = 0.259—validate hypothesis number two. According to Hypothesis 3, talent acquisition (SHRM) = 0.209, employee wellness (SHRM) = 0.218, performance management (SHRM) = 0.227, and diversity initiatives (SHRM) = 0.223 are all highly influenced by sustainable human resource management. The financial indicators customer satisfaction (SD) = 0.268, internal process efficiency (SD) = 0.252, and learning and growth metrics (SD) = 0.263 strongly support hypothesis 4. All things considered, the route coefficients with their corresponding values support the theoretical connections in the model.

The results show a strong correlation between the major variables. The Balanced

Scorecard has a **78.5%** overall contribution to sustainable development in the healthcare industry. BSC measures—that is, measurements related to finances, customer happiness, internal process efficiency, and learning and growth—significantly enhanced sustainable development. Path coefficients, T statistics, and P-values—strong statistical evidence—all highlight how crucial these variables are in determining the success and sustainability of healthcare organizations.

Discussion:

The robust statistical support of the study highlights the critical functions of advanced accounting systems, digital transformation, strategic human resource management, and balanced scorecard metrics in determining the sustainability and profitability of healthcare organizations. It emphasizes the significance of utilizing new technology in healthcare and the transformational advantages of digital efforts on overall operational enhancement. The significance of effective data management and optimal financial operations in augmenting organizational performance is underscored by updates to accounting information systems. With thorough HR strategies having a favourable influence on internal operations, customer experiences, employee happiness, and organizational learning, strategic human resource management stands out as a critical component. The association between sustainability goals and organizational performance is shown by the positive correlation between BSC components and sustainable development metrics. This suggests that healthcare organizations should think about integrating sustainable development standards into employee performance evaluations. The study concludes with important implications for evidence-based decision-making by

organizational leaders by highlighting the need for strategic investments in state-of-the-art systems and methodologies to improve overall performance and sustainability in the complex landscape of the modern healthcare sector.

Conclusion:

Conclusively, this research offers significant perspectives on the connections among digital transformation, upgrades to accounting information systems, strategic HRM, and SD indicators within healthcare industry. The findings show noteworthy benefits, emphasizing the need of adopting cutting-edge technology, streamlining financial procedures, and putting in place all-encompassing HR policies in order to improve organizational performance and sustainability. The study's findings contribute to the growing body of knowledge on the intricate dynamics that occur inside healthcare organizations. Adopting these fundamental principles can help direct strategic decision-making as the healthcare industry develops and promote a more robust and sustainable healthcare ecosystem. Nonetheless, it is imperative that both researchers and practitioners understand the limits of the study and the necessity of continuing research as well as adaptability to the changing healthcare environment. In summary, this study emphasizes how crucial it is to approach organizational management strategically and holistically in order to improve healthcare systems and the communities they serve.

Limitations:

- **Cross-sectional Design:** Restricts the investigation of causation; longer-term research may yield more profound understanding.

- Self-Reported Data: Subject to bias; adding objective measurements might improve dependability.
- Limited Generalizability: Wider application is restricted by industry concentration.
- Unconsidered External Factors: Potential impacts were not taken into account; more contextual factors should be investigated in future studies.

Future Research:

Future studies should include qualitative techniques like interviews for deeper insights and longitudinal designs for more sophisticated investigation of causal linkages. Contextual influences may be identified through comparative research conducted in various healthcare settings. Examining possible moderating or mediating variables as well as the influence of organizational culture and leadership on these projects would provide to a more complete knowledge of the interplay between technology, human resources, and sustainability in healthcare companies.

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Harnessing the Potential of Green Spaces in the Sustainable Development of Urban Areas

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Abstract:

Due to increased opportunities in terms of social, economic, and healthcare facilities, there has been a significant change of population from rural to urban areas. This has created rapid urbanization in a very short amount of time, leading to the haphazard development of cities. Moreover, it has also caused the environment to deteriorate, highlighting the need for sustainable and environmentally friendly development. Sustainable development in cities is crucial for maintaining overall health and improving urban green spaces (UGS). It has a crucial part in climate change adaptation and mitigation. Awareness among people is essential for successful adaptation, and educating children at the school level about the benefits of UGS and their environmental significance is crucial. Implementing laws and policies will be ineffective without this awareness. This paper talks about the importance of education of urban greens among people and the ways in which it should be inculcated into the education system. Through a literature review of different cases around the world, the paper attempts to understand the different approaches in the education system and the challenges faced. Based on the outcomes of the studies conducted, the paper suggests an approach that can be utilized in the education system to spread awareness about the importance of greens in the living environment. This will help in the proper optimization of urban green infrastructure. Urban areas lacking green spaces as well as spaces for outside recreations leading to unhealthy life choices, distorted natural environment perception. Increased awareness is crucial for successful urban greens incorporation, promoting a more natural environment.

Keywords: Education, Urban Green Spaces (UGS), Sustainability, Urban green infrastructure

Introduction:

Sizeable population is moving to cities as availability of opportunities is more in cities and is raising. The increase in population in a short period of time to satisfy their requirements has led to the haphazard development of the cities. Especially when talking about the Indian scenario, the shortage of land and huge migration to cities have led to the concrete

construction of metropolitan areas that are damaging both environment and biological species that inhabit them. The amount of green space is diminishing every day as built spaces continuously encroach on the city's green spaces, giving rise to global warming. This has led to the ever-changing, intense climatic conditions in cities. The green spaces are vital to preserving the environment, which is necessary for our survival. They are important for sustainably

Abbreviations: Urban Green Spaces (UGS), Sustainable Development (SD), Environmental Education (EE), Sustainable Development Goals (SDG), National Curriculum Framework (NCF)

developing the world around us and are intertwined with different interdisciplinary approaches. Hence, for the improvement and development of urban green, political, economic, socio-cultural, managerial, and planning factors must be considered (Haq, 2011).

The efficient development of sustainable cities is one of the most significant challenges that many nations across the globe are experiencing. Introducing urban green spaces in this context can be one of the solutions, as it provides social, economic, cultural, and psychological benefits to the residents. Moreover, improved environmental quality has emerged as a sensible objective that supports sustainable and low-carbon development. (Shi & Woolley, 2014) By introducing greens at the city level, the connection between people and the environment can be restored, which overall helps improve the liveability of the area. UGSs have the potential to have a good impact on people's social lives and psychological behaviour by expanding the amount of nature that people may access, which is otherwise constrained due to the rising complexity of urban life (S & K, 2021). Hence, the main objective of SD in cities is to ensure that the overall health of urban areas is maintained and improved through UGS.

The main highlight of the study is the awareness among people and its importance in education systems. Even though there are actions taken for sustainable development, the general public is unaware of them. Awareness regarding sustainable actions can make people sensible towards them, making the actions taken successful. Through awareness, residents are informed and take part in the policy-making process, resulting in the comprehensive and effective long-term growth of their surroundings.

There are multiple ways through which awareness can be raised among citizens, but awareness raised through education at a young age can be more effective. Considering what is known from the available literature, it is clear that creative, practical, and appealing methods of educating pupils about the SDGs are required. (Manolis & Manoli, 2021) “The SDGs may act as a source of inspiration and motivation for academic researchers seeking solutions; therefore, increasing students' understanding of them is crucial for both their implementation and upcoming breakthroughs.” Hence, the paper talks about different cases across the world that have included sustainable development goals in the early education system. Through this, the challenges and way forward on the scenario are gathered that can help in finding ways to inculcate in the education system in the Indian context.

Sustainable Development & Urban Green Spaces

Sustainable development is defined as “development that meets current demands without risking future generations' ability to meet their own needs (Sustainable Development Commission, 2019).” It has been observed over the past two decades that economic growth has had a negative impact on environmental conservation. Resources on Earth have been used in ways that are inefficient and unfriendly to the environment, leading to negative outcomes, including declining air quality and global weather conditions. Sustainable development therefore means embracing expansion while using resources more wisely and taking into account both the immediate and long-term benefits. There are three primary objectives of Sustainable development namely growth of the economy, protection of the environment, and inclusion of all communities.



Figure 1: Sustainable development objectives (Steinbrink, n.d.)

Narrowing down to environmental protection, the paper talks about how preserving urban green spaces is related to sustainable development. The World Urbanization Prospects Report states that urban regions house 53.40 percent of the total population of world, with population increase by 0.5% per year. Urban green spaces (UGS), such as roadside plantations, institutional plantations, parks and household gardens, are critical for ecosystem services while accounting for only 4 percent of the world's land (Pradhan et al., 2020). Numerous functions served by urban green spaces enhance citizens' standard of living. There is therefore general agreement on the importance as well as application UGS for creation of environmentally friendly urban areas in the 21st century. Particularly in emerging nations, urban heat and the continually growing traffic conditions do not only hurt the environment; they also have a detrimental impact on socio-economic conditions of the inhabitants. It is hard to disregard the ecological benefits afforded by green areas in today's sustainable planning. It ranges from maintaining and

safeguarding nature to contributing in the management of change.

Green areas present in the inner parts of cities are extremely vital for improving the quality of the air because they absorb the gases and particles that lead to respiratory illnesses. The energy expenses of adequately cooling buildings are also reduced due to green landscapes. Additionally, green spaces add to the visual and amenity value of a property. However, the neurological and societal benefits of green open spaces in an urban area are those that are most sought after. Public parks and gardens, as well as urban green spaces, provide recreational opportunities.

Urban Greens and Sustainable Development

Woodlands, parks, gardens, squares, cemeteries, and allotment gardens are examples of open, vegetation-rich environments in cities. They are part of the urban green fabric or system and encompass the preservation of the natural environment and landscape (Smaniotto Costa, Mathey, & Šuklje Erjavec, 2008). "The sum of all green spaces that comprise the urban green fabric or system is referred to as urban green (Smaniotto Costa, Mathey, & Šuklje Erjavec, 2008)."

Cities are facing increased population growth, resource constraint, and the consequences of climate change, demanding UGS for sustainable, healthy areas to address these issues. (WHO, 2017) Urban eco-friendly infrastructure is increasingly being recognized as a vital structural element of urban centers and as being essential to the global development of sustainable practices. "Urban green infrastructure design, provision, management, conservation, and restoration are increasingly acknowledged as essential elements of any comprehensive and practical strategy for urban sustainability as a result of the growing interest in

sustainable development (Hanna & Comín, 2021).”

The performance of urban settings, community resilience, and socially responsible lifestyles are all enhanced by adopting greenery and other nature-based strategies, which also benefit the health and wellbeing of urban residents. We are dependent on the trees and vegetation; if we do not continuously work toward sustaining them, they will not last. Green spaces provide a variety of diverse and broad purposes.

However, due to its connections to societal and environmental issues, transportation, and the health of the environment and people, sustainable development is based on a variety of additional factors other than urban green spaces (Hanna & Comín, 2021). The role of urban greens in the creation of liveable spaces is not common knowledge among the majority of human beings. This makes them insensible towards the attempt to restore it. Inculcating this basic knowledge in children from an early age can make future generations more aware of the environment and how to care for it.

UGS and Ecosystem

UGS are ecosystems within cities that provide ecosystem services like purification of air and microclimate mitigation. They are made up of shrubs, trees, soil, water and grass (Hirabayashi, 2021). Urban green spaces provide numerous benefits to people, including the enjoyment of natural features like flowers, trees, and wildlife, educational and social opportunities, and healthy leisure spaces. They enable interpersonal connections, group involvement initiatives, and healthy leisure activities. Linkages are drawn between walkable green spaces and better health as well as outdoor exercise, and urban senior people may live longer if they live in walkable green spaces. Among

various health benefits, it has been observed that a greener environment also helps in the reduction of deaths related to stroke. The utilization of green areas for recreational and physical activities depends on environmental variables.

In places such as eateries, environmental centres, museums, libraries, and cafes, urban greens become a necessity. They offer sports, events, and social capital, promoting social inclusion and community cohesion among residents. Green areas also act as a space for strengthening socio-cultural ties and building communities, impacting social capital positively. Residential green spaces are more beneficial when people engage in passive activities like walking, socializing, and observing their surroundings.

They help in regulating the climate, improving the quality of air in dense urban environments, promoting outdoor recreational activities, and positively impacting biodiversity. All these ecosystem services impact the inhabitants. Thus playing a crucial role in an inhabitant's lifestyle and quality of life. It impacts the overall ecosystem, i.e., the protection of wildlife, by stopping the fragmentation and seclusion of wildlife. Thus playing a crucial role in ecosystems.

Lower ambient temperatures are one of the many contributions of urban greens. It provides a comfortable temperature for human body and better quality of air. Though greens help in reduction of UV rays, maintaining a conducive temperature for human body and so on but at micro level the building's orientation, expanse, compactness decides the extent of heat reduction the greens surrounding can provide. There are also some studies that discuss how little the significance of greens is in contributing to quality of air.

As discussed above, various factors associated with a building play a role in the

amount of heat reduction. Similarly, green space scale is a term used that refers to the expanse of greens in a particular area and how it directly impacts the amount of temperature regulation that happens in that area. Various studies indicate the role of mature trees in cooling the surrounding area and reducing the temperature in green areas. They manage the urban climate by providing shade, thermal comfort, and relief from the heat island effect.

We have by now discussed in detail the crucial role of urban greens and gardens in temperature regulation, but we should also know that the distribution of pollutants in cities depends on the architecture as well as the location of urban greens. Apart from this, inhabitants' personal experiences also depend on the kind of green areas one has in their locality and the amount of pollution at the household and community levels. The streets with a line of trees tackle pollution better in comparison to narrow streets without greens.

The various levels of greens and greens of different species have varied effects on their surroundings. It is directly related to the amount of heat reduction it can provide in that specific area. A dense green space that provides greater relief from heat is one such example of dense green space. When a continuum is maintained between green areas in an urban setting, its effect on heat reduction is large when compared to isolated green spaces.

We have already explored the benefits of green spaces for heat regulation and their ability to do so from the city to the neighborhood level. Moving forward, consider the building level. The methods of heat reduction at building level include greening the walls and roofs to reduce pollution and provide a shield from outside heat. Green roofs, when placed in a direction opposite the wind, reap more benefits. Evapotranspiration helps with heat reduction, which is a result of greening

walls. While these methods do produce similar levels of heat reduction and pollution control as an urban forest might provide, But the maintenance and installation expenses are higher. Carbon sequestration happens when green infrastructure in urban spaces captures carbon. It balances carbon emissions and maximizes carbon sequestration.(Hernandez et al., n.d.)

Urban Greens and its Benefits

UGS, which includes an array of areas such parks at many levels from society to city, sports grounds, urban forests, and more, are vital and diverse elements of community development. These areas offer a sense of continuity, respite from the stress of city life, and locations for social gatherings and celebrations with others. They are sustainable and diverse.

UGS can be further be classified into public involvement, active sports spaces, children's spaces, natural green areas, formal green areas, informal green areas, land management policies, and recreational activities. In addition to public parks, reserves, athletic fields, streams, riverbanks, greenways, walks and paths, neighborhood shared gardens, street trees, and other locations, they can be found in number of constructions and forms.

UGS come in many forms and are crucial for the growth of communities. Green areas protect the environment, social components, and economy while bridging the gap between the urban and natural worlds. Ecosystem services are also supplied by public woods, green roofing on all types of buildings, and abandoned and reclaimed land. Long-term regeneration projects are guaranteed by productive land use, and green areas can generate income by putting sustainable urban projects like drainage systems into place.

Communities place a high value on green spaces because they are horizontally maintained at the same level, unfenced, and may be thought of as a continuity. They help inhabitants feel more connected to one another, communicate with one another, form social bonds, and maintain community cohesion.

One of the most significant indicators of neighborhood satisfaction is how green a community is. To summarize, UGS play a crucial part in community development by offering a variety of sustainable locations where individuals can find respite from the stress of city life, gather and celebrate with others, and feel a sense of continuity. Communities may create a livelier and sustainable environment by integrating green spaces into planning of urban areas.

Benefits

UGS have positive effects on the wellbeing of inhabitants and other components of an ecosystem in both direct and indirect ways. Unlike artificially built infrastructure, there is no recognized way for objectively evaluating the function of green infrastructure. (Hirabayashi, 2021) The vulnerability and adaptability of cities are heavily reliant on the quantification of ecological services. (Pradhan et al., 2020) But functionality of Urban forests cannot be quantified. Urban forests are frequently constructed with qualitative outcomes in mind, such as aesthetics and prosperity (Hirabayashi, 2021). Moreover, as they produce less pollution, communities that support green infrastructure are more liveable and healthier. The benefits provided by UGS are translated into ecosystem services. Ecosystem services are distinguished by their contribution to human welfare because they are the recipients of these services that humans enjoy, consume, or use. There are numerous advantages to having urban green spaces, which are listed below:

a. Environmental Benefits

i. Ecological Benefits

There are large variations in solar rays, temperature of air, wind velocity, and absolute humidity due to the built structure of urban areas. In cities, surfaces absorbing heat, when paired with the consumption of high energy, result in the effect of urban heat islands. If proper forest planting is not followed, it has been shown to raise temperatures in cities by 5 °C (Bolund & Hunhammar, 1999).

i. Reduction in Pollution

Some of the contributors to the pollution caused in urban areas are biological waste manifesting into liquid droplets, particles of solid or gas, particulate waste, and chemicals. Children, the elderly, and those with respiratory problems are the groups most impacted by harmful chemicals (Sorensen, Smit, Barzetti, & Williams, 1996).

The total cost of noise has been estimated to be between 0.2% and 2% of the European Union's GDP (Bolund & Hunhammar, 1999). In densely populated cities, urban green spaces can dramatically reduce noise levels. Complex urban ecosystems are considered in contemporary urban greening research. Conservation of green space helps in maintaining natural ecosystem networks for ecological sustainability in cities. Various factors, such as quantity, quality, and proximity, play a role in helping urban green areas reduce noise levels in dense cities. Various factors such as quantity, quality and proximity play a role in helping urban green areas to reduce the noise levels in dense cities.

ii. Biodiversity and Nature Conservation

Urban green spaces are critical to safeguarding the ecological elements of sustainable urban landscapes. They offer seasonal variety, visual comfort, and connection with nature. Through the use of

green spaces and plant species that are self-sufficient and sustainably adapt to local conditions, sustainability can be achieved. Biodiversity conservation can benefit from highlighting the socio-cultural context of biodiversity and archiving traditional knowledge. The importance of plant species on farm boundaries, as well as traditional knowledge about their use and practices in farming households, is evident (Nautiyal & Goswami).

b. Economic and Aesthetic Benefits

- i. **Energy Savings** - Plants not only provide shade and improve air flow, but they also sweat, which provides cooling. A study conducted in Chicago and it was discovered that a 10 percent increase in tree cover might lower total heating and cooling power demand in a city by 5-10 percent" (Sorensen, Smit, Barzetti, & Williams, 1996). A 1.2 kilometer x 1.0 kilometer park can measure temperatures up to 4 kilometers away from the park and neighbouring cities (Heidt & Neef, 2008).

i. Property Value

Urban areas with a lot of greenery are also more aesthetically pleasing and appealing to investors as well as locals. There is strong evidence that landscaping and green space increase a land developer's housing values and economic returns by up to 15%, based on the type of project. One of the components that attracted large foreign funding in Singapore and Malaysia was the beautification of their urban areas (Oguz, 2000).

c. Social and Psychological Benefits

i. Recreation and Wellbeing

Inhabitants of the residential neighborhood meet the majority of their leisure needs. As

per (Nicol and Blake, 2000), cities house above 80 percent population in the United Kingdom, so UGS contribute significantly to all outdoor leisure activities. According to a study conducted, 97% of city dwellers in Helsinki, Finland, participate in some aspect of nature every year. A daily or alternate-day visit to the outdoors is made by half the population (Neuvonen, Sievänen, Tönnés & Koskela, 2007). The green environment of the city provides nearby resources for emotional warmth and relaxation (Heidt & Neef, 2008). In Mexico, conveniently located 'Chapultepec Park' attracts around 30 lakh people each week. (Sorensen, Smit, Barzetti, & Williams, 1996).

ii. Human Health

Those connected to natural areas exhibited rapid relief in stress, as opposed to those connected to urban environments, where stress levels continued to increase. (Bolund & Hunhammar, 1999). According to the same analysis, a patient in a hospital whose room faced a park recovered at a faster pace and needed half as many strong pain relievers as a patient whose room faced a concrete wall. This demonstrates emphatically how city inhabitants' physical and emotional health can be enhanced by urban green spaces. A different investigation carried out in a Swedish city discovered that the stress levels of people depended on the amount of time spent in green areas. If more time is spent outside in green areas, people are less stressed. (Grahn & Stigsdotter, 2003). Urban sacred natural sites, which offer cultural and environmental advantages are under growing threat from urbanization. These locations, which range from Nepal to Poland offers spiritual advantages in addition to ecosystem services like reducing environmental pollution. Some of them have been listed as UNESCO World Heritage Sites, drawing visitors. Diverse management approaches and users should

be considered in future conservation initiatives. (Ormsby, 2021)

People's Perception of UGS

It has been quite clear that UGS benefits humans in multiple ways, ranging from pollution control to social and psychological benefits. However, in general, humans are not aware of the benefits of it and hence do not take any actions towards conserving it. No long-term conservation initiative can ever be successful in any country without environmental education and awareness among regular citizens, as well as without enlisting the common people as significant stakeholders in the process of preserving our natural habitats.

The Need for Inclusion of Sustainable Development in Education System

Learners must be educated in order to comprehend the situation at hand as well as its future impact. Genuinely desire to preserve the earth and its environment, there is need to modify our methods of interaction with it, the ways in which we exist, produce, and use it. Sustainable development education must be a fundamental shift everywhere (Vieira, Rumenos, Gheler-Costa, Toqueti, & Spazziani, 2022).

Studies have revealed a substantial correlation between lower levels of education, the human development index, and higher rates of deforestation (Godoy, Groff, & O'Neill, 1998). UNESCO (2021) has insisted that EE become a required subject in all nations' curricula by the year 2025 so as to successfully promote citizen participation and action on major global concerns. Introducing education on the environment from an early age can have an impact on children as well as parents. A child's environmental literacy can help them develop a lasting love of and connection to the natural environment.

People may become callous due to a loss of connection to nature and a lack of ecological knowledge, which makes them uninterested in creating eco-friendly socioeconomic systems and lifestyles that are in harmony with the environment. Building awareness among the community regarding the issues the environment faces can help in forming effective policies and creating remedies for these issues. In this manner, environmental education would support environmental protection and nature connection through a top-notch framework that includes consciousness, awareness, attitudes, capability, and engagement, in which individuals engage with the ecological environment to promote people's health (Vieira, Rumenos, Gheler-Costa, Toqueti, & Spazziani, 2022). Without education, which requires evaluating, decoding, comprehending, incorporating, and acting for the greater good, humanity has no future (Brandao, 2008).

The significance of environmental education at this time is because of the critical requirement for ecological responsibility and consciousness to more efficiently promote the repair and restoration of the environmental surroundings by battling the detrimental impacts of our activities during the preceding decades. The primary goal of EE is to provide both conceptual and applied activities in order to: encourage public engagement in order to lessen the negative repercussions of human activity; and strengthen civic responsibilities concerning nature and environmental control (LAYRARGUES, Pomier, & Ferreira, 2011). Both of these can enhance the wellbeing and quality of life of people and other creatures, as well as the environment (Vieira, Rumenos, Gheler-Costa, Toqueti, & Spazziani, 2022). Particularly for primary school students, initial and consistent exposure to the environment

may be more important for optimal learning and achievement.

Through environmental education, engagement among people can help improve and enhance the green spaces around them. As the students in cities are surrounded by a lack of nature, they grow detached from the environment and their duty towards maintaining it. A child's growth of the cognitive intellect, the nervous system, psychological wellbeing, and well-being are all enhanced by exposure to the environment. Stress, anxiety, and aggression are also decreased, as is the risk of cardiovascular disease, obesity, and diabetes (Frumkin et al., 2017). (Bhat, Zahid, Sheikh, & Parrey, 2017) in their paper has explained how educating the citizens about environment impact sustainable development.

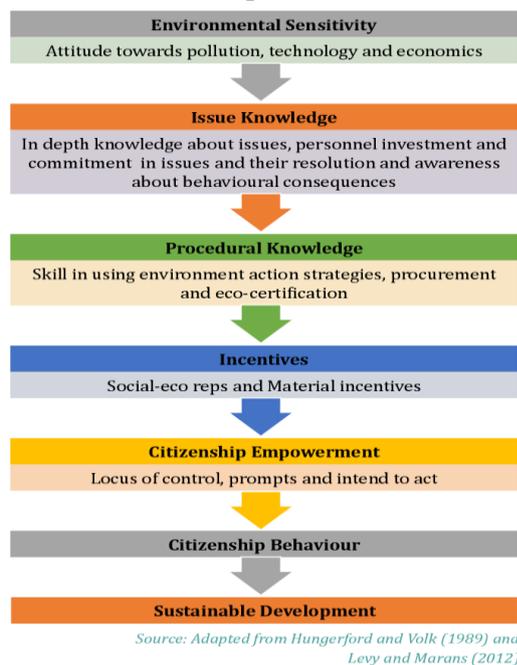


Figure 2: Environment Citizenship Behavioural Flowchart (Bhat, Zahid, Sheikh, & Parrey, 2017)

Scenario of Environmental Education in India

Environmental education is an important part of a lifetime education program that

adapts to global changes by understanding major issues and developing qualities and abilities for improving life and conserving the environment while considering ethical values. Environmental education's primary goal is to help people and communities acknowledge how the environment and built environment behave as a consequence of on-going interactions between biological, physical, social, economic, and cultural factors. It also strives to give people the information, morals, and practical abilities they require to actively participate in recognizing and resolving environmental problems as well as managing the environmental quality (UNESCO, 1977).

India's supreme court has mandated environmental education in India, and the NCERT is in charge of implementing it. NCERT created the "Protection of the Environment" component of the National Curriculum Framework (Global Environmental Education Partnership, n.d.). Several funding mechanisms, such as government grants, trusts, and CSR programs, may be used to support environmental education efforts in India.

Supreme court has made environmental education compulsory to be included in the curriculum. The NCERT is responsible for monitoring the directive. According to Article 48A, the Indian constitution, along with the respective states, notes to "take measures to protect and improve the environment and to safeguard the forests and wildlife of the country (*THE CONSTITUTION OF INDIA.Pdf*, n.d.)." Along with it, another article 51-A states that "it is a fundamental duty of every citizen to protect and improve the natural environment, including forests, lakes, rivers, and wildlife, and to have an ecological compass for the living creatures (*THE CONSTITUTION OF INDIA.Pdf*, n.d.)." The only way to protect it is by providing education and awareness among

the people. The current position of environmental education in Indian schools stems from the 1986 National Policy of Education, which designated "Protection of the Environment" as a common core for the NCF (Global Environmental Education Partnership, n.d.).

When the Indian Supreme Court (Supreme Court of India, 1991) ruled that environmental literacy should be integrated into all academy levels, it brought great progress to the country. The court has ordered environmental courses to be mandatory for students as an opportunity to integrate an interest in sustainable development into higher education. The University Grants Commission (UGC), which is liable for setting policy groundwork for colleges and other higher education systems, received further plans of action from the court to aid and ensure the delivery of this course. Even though earlier environmental education was part of the education system of India, it was not adequately directed, and no specific steps were taken to incorporate it into the system. However, in recent years, due to the grave necessity of raising awareness among people regarding the environment, appropriate steps have been taken by the government.

Challenges faced

One of the few nations across the globe that have formal ENVIRONMENTAL EDUCATION curricula is India. However, according to Yale University, 65% of Indians are still unaware that climate change is a threat. 80% of the remaining 35%, who are primarily educated individuals, view it as a major threat. There have been many initiatives taken throughout the years to incorporate environmental education into the education system, but the topics covered are unrelated to the current issues of climate change.

Environmental education in India has been significantly impacted by the country's rapid economic expansion because of the numerous environmental problems brought on by the depletion of natural resources. "Additionally, the Indian educational system has changed to develop consumers who can contribute to the global economy due to the level of pollution, overpopulation, fast deforestation, and overexploitation of natural resources in the drive to become a global economy (Foundation, n.d.)."

There is a lack of practical knowledge regarding the environment. This can help students' associations with environmental issues become stronger. Students will be inspired to come up with answers once they understand how directly connected environmental challenges are to their existence and development. It will cause them to adjust their attitude. This should then be related to the complicated international environmental issues. Moreover, to encourage students to actively participate in addressing environmental issues in their immediate surroundings, curricula should encourage practical training. Students should be educated about world realities outside of books.

Conclusion

The world of today is in grave danger of a climate crisis. One of the ways to mitigate the crisis is through sustainable development in urban areas. The cities of today are deprived of nature, and their impacts are seen all over the world. Their needs include the inclusion of UGS in the cities in order to sustainably develop them. Urban green spaces provide multiple ranges of benefits to the people that help in the cities' overall sustainable development. There have been several policies and laws passed in order to accomplish the growth of UGS. But one of the major problems

hindering successful implementation is lack of awareness among people. This lack of environmental awareness is due to both the lack of literacy and the lack of proper environmental education in the schooling system.

Awareness in an individual can make them sensible to the damage and encourage them to take part in efficiently developing cities. India has taken various measures and is one of the few countries with official environmental education. It is time to redesign our educational systems so that learning is based on sustainability, conservation, and nature.

Further research on the study can explore the ways in which environmental education can be improved. There has been enough literature on the challenges in the Indian education system. Improvement strategies can help decrease environmental illiteracy among citizens and overall help in the development of cities that are both environmentally friendly and resilient.

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